

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JULY 19 and 26, 1935.*

I.—GENERAL; PLANT; MACHINERY.

Basis of heat calculations in furnaces. W. HEILIGENSTAEDT (Stahl u. Eisen, 1935, 55, 334—337).—By means of the laws of the theory of heat many problems in furnace design may be solved, but difficulties arise largely because of the lack of fundamental data, such as heat conductivity, sp. heats, etc. of materials used in furnace construction. W. P. R.

Protecting pressure vessels with rupture discs. M. E. BONYUN (Chem. Met. Eng., 1935, 42, 260—263).—The bursting stress (P) of Ag, Cu, Al, Ni, and Pb discs of different thickness (T) is plotted against the disc diam. (D). The curves may be represented by $P = C/D$, in which C is a const. depending on the T of the disc. The erratic physical characteristics of sheet Fe and alloys, e.g., brass, monel metal, when rolled to the desired T render them unsuitable for rupture discs. D. K. M.

Sampling analyses and sample size. M. C. HOLMES (J. Franklin Inst., 1935, 219, 483—486).—The size of sample (I) necessary depends on tolerance limits, degree of assurance that the limit of accuracy will be reached, and homogeneity of material. An expression (II) is derived connecting these quantities. (I) required for a given accuracy increases with the square of the heterogeneity of the material and is \propto (tolerance limit)⁻². (I) increases rapidly with increase in the degree of assurance required. It is not possible to decide (I) until information has been obtained by experiment concerning the order of magnitude of the coeff. of variability of the material. (II) is in good agreement with experiment. A. J. M.

Examples of the use of the pipette method of determination of grain size, especially of mineral colours. A. H. M. ANDREASEN and S. BERG (Angew. Chem., 1935, 48, 283—285).—Sieving is the simplest method for sizes > 0.1 mm. The pipette method, used for finer powders, consists in setting aside a homogeneous suspension for a given time and then withdrawing samples from given depths. With H_2O as medium the method is suitable for grain sizes of 30μ to 0.3μ . With glycerin up to 300μ can be determined. Grain size is calc. from Stokes' law. Precautions against coagulation are necessary; e.g., in soil tests, Ca must be removed. Grain-size curves for a no. of mineral colours are given. C. I.

Determination of efficiency of continuous mixers and reactors. R. B. MACMULLIN and M. WEBER, JUN. (Chem. Met. Eng., 1935, 42, 254—257).—The effect of short-circuiting of liquids in continuous operations is considered mathematically. Curves are given showing the effect of the no. of tanks on the fraction of the original

contents remaining in the system after a given time, and on the % decomp. for reactions of different orders; examples illustrating their use are given. D. K. M.

Distillation and rectification of dilute solutions of volatile substances. I. Theoretical study and the case of heavy water. P. JAULMES (Chim. et Ind., 1935, 33, 1045—1052).—Distillation and rectification are considered in relation to the ratio of solute concn. in vapour and liquid, the ratio of liquid refluxing to vapour supplied, and the type and length of fractionating column. The conditions for the concn. of dil. AcOH and heavy H_2O are given. R. S.

Waste-heat recovery from retort settings.—See II. **Rusting of Fe. Welded equipment.**—See X. **Beet-sugar evaporating plant.**—See XVII. **Hand homogeniser.**—See XX.

See also A., June, 721, **Production of low temp.** 723, **Conicocylindrical viscosimeter.**

PATENTS.

Heat-treating furnace. A. L. STEVENS, ASSR. to A. L. STEVENS CORP. (U.S.P. 1,973,934, 18.9.34. Appl., 2.9.31).—A walking-beam bed is described, attention being given to sealing the spaces between the fixed and moving sections. B. M. V.

Effecting [exothermic] catalytic reactions. A. O. JAEGER, ASSR. to SELDEN CO. (U.S.P. 1,972,937, 11.9.34. Appl., 5.3.30).—In a system which evolves more heat than is necessary to raise the feed gases (F) to reaction temp., another gas (G) is passed in heat-exchange relation with the catalyst mass and part of the thus heated G is passed through a vapour generator and only the other part in heat exchange with F . B. M. V.

Production of heat and cold. A. F. LEBRE (B.P. 427,957, 28.8.33).—Gas is (1) compressed, (2) cooled at the const. high pressure (the heat being utilised), (3) expanded to the original pressure (the cold being utilised), and (4) heated to the original temp. Mechanical energy is transferred from (3) to (1) by means of a rotor divided into compartments which are connected by a fixed casing and conduits containing (another) gas which transmits pressure but not heat. B. M. V.

Crusher. L. P. GREEN (U.S.P. 1,972,930, 11.9.34. Appl., 22.7.29. Renewed 1.2.34).—The faces of the crusher jaws apparently intersect, the effect being obtained by forming the lower portions with very deep teeth which always intercalate. B. M. V.

Apparatus for mixing materials. W. KROEFFLE, ASSR. to F. KRUPP GRUSONWERK A.-G. (U.S.P. 1,973,002, 11.9.34. Appl., 2.3.32. Ger., 11.4.31).—A rotary drum is divided into feed (F) and outlet chambers (O) of smaller diam. and intermediate main chambers (M) of full diam.

* The remainder of this set of Abstracts will appear in next week's issue.

Grinding bodies (*G*) and material work through together and are separated by a screen in *O*, and *G* are returned to *F*. Stationary scoops are provided in *M*. B. M. V.

Apparatus for separating dirt from coal and for other analogous uses. W. BARKER (B.P. 427,499, 30.10.33 and 16.8.34).—2 pneumatic shaking tables (*A*, *B*, . . .) are arranged in series with transverse troughs (*T*) to collect the dirt or heavy material. The whole of the material is fed to *A*, which is mounted on spring bars of such inclination that the shake produces forward travel. At the discharge end of *A* a clean upper layer is skimmed off and the middling and dirt drop on to *B*, which is sprung to produce backward travel of the heavy material although an average forward travel is maintained by suitably sloping *B*. The first *T* is situated at the upper end of *B*, and other *T* for dirt or final unseparable middling are farther down *B* or under any subsequent table. B. M. V.

Extraction apparatus. "MIAG" MÜHLENBAU U. IND. A.-G. (B.P. 428,024, 23.11.34. Ger., 23.11.33. Addn. to B.P. 414,521; B., 1934, 912).—The lixiviation passage is oval, a chain conveyor with perforated push plates being installed therein. B. M. V.

Hydraulic washing, cleaning, and separating apparatus, particularly adapted for cleaning coal. R. J. TUGWOOD. From JEFFREY MANUFG. Co. (B.P. 427,793, 24.7.33 and 24.8.34).—Jigging is effected by cam-operated pistons or diaphragms acting directly on the H_2O , the cams giving a cycle, e.g., as described in B.P. 424,834 (B., 1935, 434). B. M. V.

Apparatus for washing coal or the like. B. NORTON (B.P. 427,805, 31.10.33).—In a hydraulic jig the feed is divided into two sizes and the fractions are jigged on separate beds extending over a different no. of compartments, each compartment having separate control of the motive air. B. M. V.

Presses for moisture-containing materials. ROSE, DOWNS, & THOMPSON, LTD., and L. H. DOWNS (B.P. 427,571, 30.12.33).—In a press of the worm type having a conical choke (*C*) at the delivery end, *C* is adjusted by hydraulic means embodying double-acting rams. B. M. V.

Centrifugal machines. SHARPLES SPECIALTY Co., Assees. of L. D. JONES (B.P. 427,756, 16.11.33. U.S., 17.11.32).—Automatic means of charging, washing, and discharging a basket-type centrifuge are described. Discharge of solids would be effected if any out-of-balance wobble were to take place; the turning tool is hydraulically operated and the depth of cut automatically adjusted inversely as the friction pressure on the tool. B. M. V.

Regulating device for [the feed to] centrifugal separators. AKTEB. SEPARATOR (B.P. 427,873, 20.11.34. Swed., 22.11.33).—In a float having an upwardly extending neck which forms the inlet passage (*P*) and extends into and obstructs a fixed supply pipe according to the level, the lower end of *P* is flared to prevent the velocity in *P* affecting the velocity of outflow through an aperture below *P*. B. M. V.

Gas and liquid separator. J. A. O'BRIEN, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,973,650,

11.9.34. Appl., 22.8.30).—A separator for use, e.g., at the bottom of an oil well causes the oil-gas mixture initially to travel upwards in a confined annulus, above which is a comparatively large chamber whence the gas alone passes straight upwards into the well casing and the oil flows downwards and then inwards into the operating tube of the well. B. M. V.

Evaporating apparatus for concentrating acid liquids. APPAREILS ET EVAPORATEURS KESTNER (B.P. 427,869, 30.10.34. Fr., 30.10.33. Addn. to B.P. 195,365; B., 1924, 359 B).—In a climbing-film evaporator (generally as the prior patent) a hot liquid is substituted for the heating steam and the cross-section of the jacket reduced to give good heat transfer with a comparatively small vol. flow of liquid. B. M. V.

Regulating evaporators and like apparatus, particularly in connexion with elastic-fluid turbine plants. D. F. WARNER, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,974,976, 25.9.34. Appl., 11.12.31).—In a system comprising a back-pressure turbine and an evaporator, hydraulic relays are introduced to reduce the time lag of the controls initiated by change in the various v.p. B. M. V.

Apparatus for distilling crude oil and other liquids. G. W. T. BECK (U.S.P. 1,974,701, 25.9.34. Appl., 9.2.32).—The liquid (*L*) is allowed to flow down an elongated, inclined chamber the bottom (*B*) of which is heated by burners under control of thermostats (*T*) dependent on the temp. of *B* rather than on that of *L*, comprising, e.g., Hg in actual contact with *B*. *B* is of laminated construction, alternately of steel and Cu plates. B. M. V.

Treatment of liquids. J. N. JACOBSEN, Assr. to PFAUDLER Co. (U.S.P. 1,973,531, 11.9.34. Appl., 21.1.32).—The liquid, e.g., milk or the like, is circulated through a closed heat-transfer system and subjected in succession to fine subdivision or spreading in films, a partial vac., pasteurisation, and cooling. B. M. V.

Apparatus for treating liquids and gases. A. F. CLARKE (U.S.P. 1,973,141, 11.9.34. Appl., 2.2.34).—In a tower, bubble caps are constructed with internal spiral vanes to cause whirling and centrifugal deposition of mist. B. M. V.

Apparatus for contacting gases or vapours with liquids. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 427,610, 19.10.34. Holl., 4.11.33).—Trays for a column (*C*) are divided into slightly stepped sections and the downflows are situated to cause the liquid to cascade across the *C* in opposite directions on successive trays. B. M. V.

Water-softening apparatus. A. J. DOTTERWEICH, Assr. to GEN. WATER TREATMENT CORP. (U.S.P. 1,954,405—6, 10.4.34. Appl., [A] 19.1.24, [B] 8.7.24).—Claims are made for automatic apparatus, controlled by the electrical conductivities of the hard and the softened H_2O , for softening H_2O by the zeolite (*Z*) process and regenerating the *Z* as required. A. R. P.

Prevention and removal of boiler scale. P. KAHN, Assee. of A. VON MAUTNER-MARKOF (B.P. 427,373,

29.6.34. Ger., 22.7.33).—The boiler H_2O is subjected simultaneously to electrical oscillations of high and low frequency. The former may be obtained from a broad-casting station by means of an aerial, a negligible current being required. B. M. V.

Correction of the chemical-physical equilibrium in bicarbonate-containing service water in hot-water plants. A. GULDAGER (B.P. 427,766, 20.8.34).—The H_2O is electrolysed at low voltage with a current approx. 10–25% of that which would be necessary to ppt. 30% of the bicarbonate "by normal electrolytic action" [3–8% of the electrochemical equiv. of the total $Ca(HCO_3)_2$ etc.]. B. M. V.

Apparatus for aerating liquids. G. S. HIGGINSON and J. C. VREDENBURG (B.P. 427,806, 31.10.33).—An apparatus for the manufacture of, e.g., aerated H_2O for immediate consumption is described. B. M. V.

Gas scrubber. F. H. DANIELS and K. K. NAHIGYAN, ASSTS. to RILEY STOKER CORP. (U.S.P. 1,974,768, 25.9.34. Appl., 2.5.32).—A scrubber of the type in which the gas flows horizontally among irrigated columns (*C*) is described, *C* being composed of inclined plates. B. M. V.

Apparatus for separating suspended material from gases. G. H. HORNE and M. A. LISSMAN, ASSTS. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,973,764, 18.9.34. Appl., 31.5.32. Renewed 20.2.34).—A no. of vertical, vortical, tubular separators are surrounded, and thus protected from heat loss, by a casing forming a large common inlet, whereby powdered material, e.g., milk powder, is prevented from becoming sticky by deposition of dew. B. M. V.

Filters for cleaning, humidifying, or drying air or other gases. W. MANSON and E. W. H. FAIRBAIRN (B.P. 427,338, 23.10.33).—The air is drawn inwards through a perforated conical rotor (*R*) lined with a filter medium which is kept wet by capillarity or sprays. *R* is rotated at centrifugal speed which is preferably regularly varied to provide a shaking effect; the liquid and dirt thrown off *R* provides a preliminary spray-wash for the air. B. M. V.

Separation of gaseous mixtures. M. FRÄNKEL, ASST. to AMER. OXYTHERMIC CORP. (U.S.P. 1,974,065, 18.9.34. Appl., 23.5.32. Czechoslov., 2.1.32).—A system for the resolution of air or the like, utilising 3 masses for the regeneration of cold in a cyclic manner, is described. B. M. V.

Apparatus for semi-fluid and fluid evacuation [and transport]. T. F. CALLAHAN (U.S.P. 1,973,560, 11.9.34. Appl., 26.3.32).—Sludge or the like is drawn by a vac. into (so as completely to fill) a container (*C*) having a single opening (*O*) in the form of a neck at the bottom. *O* is then closed by a lid in the form of a dish and *C* remains full like a bird-fountain until transported to the point of discharge. B. M. V.

Generation of [air] foam. KOMET KOMPAGNIE F. OPTIK, MECHANIK, U. ELECTRO-TECHNIK GES.M.B.H. (B.P. 427,534, 10.5.34. Ger., 10.5.33).—Pressure H_2O is used partly to compress air by injectors and partly to mix that air with foam-forming liquid by means of other jets. B. M. V.

Hydraulic pressure fluid. J. B. ROBINSON, ASST. to CHICAGO HYDRAULIC OIL CO. (U.S.P. 1,973,660, 11.9.34. Appl., 28.3.33).—The liquid comprises glucose 20–75, EtOH 40–12.5, H_2O 40–12.5%, and low % of Na_2CrO_4 . B. M. V.

Chemical laboratory apparatus. W. O. GEYER (U.S.P. 1,973,754–5, 18.9.34. Appl., [A, B] 13.7.33).—(A) A 3-way stop-cock for charging (*C*) and discharging (*D*) a burette is described. An inclined drilling through the plug is used for *D* and a longitudinal groove for *C*. (B) A system for filling a burette by pressure embodies means for running the overflow from the const. zero level back into the stock bottle. B. M. V.

Operating liquid for fluid-pressure apparatus. WAGNER ELECTRIC CORP. (B.P. 427,998, 14.5.34. U.S., 22.7.33).—See U.S.P. 1,960,298; B., 1935, 338.

Air agitators. [Punkahs.] O. PEZZONI (B.P. 427,669, 21.2.34).

Mixing paint.—See XIII. **Recovering constituents from waste products.**—See XXIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Structure of peranthracites and true anthracites. P. LEBEAU and A. MORETTE (Ann. Off. nat. Combust. liq., 1934, 9, 603–623; Chem. Zentr., 1934, ii, 4042).—Structural differences were investigated micrographically. J. S. A.

Application of petrographic and microtectonic study of coal in recognising danger from carbon dioxide-bearing seams. R. HÖHNE (Glückauf, 1934, 70, 933–940; Chem. Zentr., 1934, ii, 3700).—The characteristic structure of coal from the region of a CO_2 outburst is described and discussed. H. J. E.

Selective flotation of coal. E. BIERBRAUER and J. PÖPPERLE (Glückauf, 1934, 70, 933–940; Chem. Zentr., 1934, ii, 3700).—Methods of separation by flotation of the reactive and inert constituents of coal are discussed. H. J. E.

Drying of peat. A. V. LUKOV (Ind. Eng. Chem., 1935, 27, 406–409).—During thermostatic drying of peat the size of cubes etc. decreases linearly with the moisture content. There are 3 drying periods: (1) with const. drying rate, during which the peat is at wet-bulb temp.; (2) with rate of drying decreasing linearly with moisture content, during which temp. rises; and (3) the rate diminishes along a curve of moisture content and is determined by the crit. and equilibrium moisture contents and a coeff. In (3) the temp. rises, but less rapidly than in (2). Satisfactory equations have been derived for (1) and (2). D. K. M.

Composition and properties of bituminous coal extracts. D. J. W. KREULEN (Brennstoff-Chem., 1935, 16, 165–169).—Solutions obtained by the extraction of bituminous coals with org. solvents are regarded as organosols comprising a liquid phase formed by a solution of the coal bitumens in the solvent and a disperse phase consisting of micelles of humic material "protected" by strongly adsorbed bitumen. The stability of the sol is determined largely by the surface tension at the interface of the two phases. The theory accords

with known data relating to the yields of extract with different solvents, solvent fractionation of the extract, etc. (cf. B., 1934, 436). A. B. M.

Determination of arsenic in coal. E. S. HERTZOG (Ind. Eng. Chem. [Anal.], 1935, 7, 163–165).—Finely-ground coal is mixed with a $\text{Na}_2\text{CO}_3 + \text{MgO} + \text{KNO}_3$ fusion mixture and ashed at 750° in air. The ash is transferred to a modified Gutzzeit apparatus, and AsH_3 generated by the usual procedure. Permanent photographic replicas may be used as comparisons in place of standard stains, which fade on keeping. J. S. A.

Carbonisation of coal. Evaluation of effects of rate of heating and of maximum temperature on pyrolysis of a coking coal. W. B. WARREN (Ind. Eng. Chem., 1935, 27, 72–77).—Pittsburg coal has been carbonised on the small scale with rates of heating of 0.7 – 21.8° per min. to max. temp. of 540° , 700° , and 1000° , at which the coal was maintained for 1 hr. Log yields of coke, gas, liquor, neutral oils, acids, and bases plotted against log heating rate give straight lines. In general, the yield of tar increased with increased rates of heating at 540° and 1000° at the expense of coke and gas, whilst at 700° both tar and gas increase at the expense of the coke. The increased yield of tar is thought to be due to the greater increase of distillation effect relative to that of decomp. processes with rising heating rates. D. K. M.

Basic thermotechnical principles of coke-oven operation. H. JÄGER (Gas- u. Wasserfach, 1935, 78, 290–293, 308–312, 332–336).—The influence of preheating, of the type of gas used, and of the amount of excess air on the thermal efficiency of a coke oven is calc. and illustrated graphically. The determination of the temp. of hot streaming gases is discussed in relation to the calculation of the efficiency of recuperators and regenerators. The theory of heat transmission is applied to calculate the influence of various factors, e.g., thickness of oven wall, flue-gas temp., on the carbonising time. A. B. M.

Preparation, marketing, and utilisation of coke. W. L. BOON (Gas J., 1935, 210, 568–577).—Wet-quenching of coke (I) produces breeze and dust. Pumping costs are not negligible. Dry-quenched (I) is superior in size and calorific val. The cost of steam raised is 6–12d. per 1000 lb. Vibratory screens do not destroy the sharp edges of (I), which cause easy ignition. Grading costs are given. 35% of breeze may be formed during grading. Fracture when discharging into bunkers should be avoided by means of special chutes. Only 4% of (I) sold is used in open fires. Distributing costs and revenue and fluctuations in demand and supply are given. Gravity-feed boilers with thermostatic control are only half as costly in fuel as oil-fired boilers. E. H. M. B.

Nitrogen absorption by brown coal on treatment with ammonia [to produce fertilisers]. K. WINZER (Brennstoff-Chem., 1935, 16, 169–170; cf. B., 1935, 325).—A fresh brown coal which was treated with NH_3 until it had absorbed the equiv. of 20–40% of N_2 (calc. on the dry coal) rapidly lost the excess NH_3 on exposure to the atm. until it contained only about 4% of “bound” N. If, however, the coal was treated with

O_2 while saturated with NH_3 , O_2 was absorbed and the loss of NH_3 on subsequent drying was less, so that coals containing 8–10% of bound N could be prepared. About 50% of the bound N was evolved as NH_3 on treatment with aq. NaOH; the remainder was probably present in ring form. A. B. M.

Hydrogenation of Japanese coals. S. UCHIDA (J. Fuel Soc. Japan, 1935, 14, 38–44).—Results obtained in the hydrogenation of Japanese coals in a 0.6-litre shaking, and a 5-litre revolving, autoclave are summarised. The effect of varying hydrogenating conditions on the yield and nature of the oil are detailed. E. S.

Waste-heat recovery from [gas]-retort settings. W. GREGSON (Gas J., 1935, 210, 561–567).—In a modern regenerative horizontal retort setting 755 lb. of steam per ton of coal can be raised by the waste gases. A further 650 lb. per ton of coal may be recovered by dry-quenching the coke. The recovery in a vertical retort setting is 1780 lb. per ton of coal. Air infiltration must be prevented as far as possible. If the waste gases enter the boiler at 1250° and leave at 250° , 70% of the total heat transfer is by radiation. If they enter at 700° , only 16.6% of the heat transfer is by radiation. Boilers must therefore be designed for contact heating. Fire-tube boilers are best, but the tubes must be frequently cleaned inside, and softened H_2O used as boiler feed. Test figures are given. E. H. M. B.

Continuous vertical retorts for small [gas] undertakings. D. W. DAVIES (Gas J., 1935, 210, 624–626).—Carbonisation of a Welsh steam coal in 6 upwardly-heated Woodall-Duckham vertical retorts is described. Only one man per shift is required. An auxiliary producer-gas flue is run to the waste-heat boiler to ensure sufficient production of steam. E. H. M. B.

Detoxication of [coal] gas. W. J. MÜLLER (Oesterr. Chem.-Ztg., 1935, 38, 81–86).—The toxic properties of CO are discussed. CO may be removed from gas by means of the reaction: $\text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2 + 10.4$ kg.-cal. at 500° . 2–3% of CO is left in the gas. The CO_2 is washed out by K_2CO_3 or under pressure by H_2O . Org. S is converted into H_2S . The treated gas has a lower d and is less likely to “strike back.” E. H. M. B.

Analysis of combustibles in flue gas. R. N. EVANS and J. E. DAVENPORT (Ind. Eng. Chem. [Anal.], 1935, 7, 174–178).—An apparatus for the analysis of incompletely burned flue gases is described (cf. B., 1932, 246). CO is determined separately with a CrO_3 trap at 100° placed before the ascarite tube to remove unsaturated impurities (cf. B., 1929, 766). An apparatus for determining the calorific content of flue gases containing little combustible material, involving oxidation over Pt at 850° , is described. J. L. D.

Analysis of complex gaseous mixtures, using a combination of the Podbielniak distillation column and the Shepherd apparatus. J. W. LANG (Ind. Eng. Chem. [Anal.], 1935, 7, 150–152).—The condensed gas is fractionally distilled through a column. Four fractions are separated: (a) gases not condensable in liquid air; (b) a volatile fraction containing H_2 , CO,

N_2 , CH_4 , and some C_2H_4 ; (c) two C_2H_6 fractions, containing also C_2H_4 and C_3H_6 , respectively. Additional C_3H_6 is added to gases low in C_2H_6 , to enable a cut to be made between C_2H_4 and C_3H_6 ; (d) a tail fraction of C_3H_6 , C_3H_8 , and higher homologues. Olefines are determined by $Br-H_2O$ absorption, and paraffins by combustion.

J. S. A.

Specific gravity and gas yield of technical calcium carbide. SAUERBREI and W. SCHERUHN (Autog. Metallbearb., 1934, 27, 289—293; Chem. Zentr., 1934, ii, 3602—3603).—The gas yield (I) falls with increasing d of the sample. Deviations of $\pm 7\%$ from Schlumberger's linear relation between (I) and d can occur.

H. J. E.

Pressure in high-pressure acetylene plants. W. RIMARSKI and M. KONSCHAK (Autog. Metallbearb., 1934, 27, 209—215; Chem. Zentr., 1934, ii, 3657—3658).—Measurements of pressures developed in C_2H_2 -air or $-O_2$ explosions under various conditions are recorded. The resistance of C_2H_2 generating plant to such explosions is discussed.

H. J. E.

High-pressure hydrogenation of low-temperature tar. II. Comparison between the derived neutral and phenolic oils. S. ANDŌ (J. Soc. Chem. Ind., Japan, 1935, 38, 145—148 B; cf. B., 1934, 913).—Low-temp. tar was separated into neutral (I) and phenolic (II) fractions, and these were hydrogenated at about $450^\circ/250$ atm. in the presence of a Mo catalyst (cf. *loc. cit.*), giving mainly an oily product (III) and some gaseous hydrocarbons. (III) (60—90 wt.-% of the tar used) consists of gasoline (IV) (b.p. $< 200^\circ$, 70—90%), kerosene (b.p. $200-300^\circ$, 6—30%), and a little heavy oil. (IV) consists mainly of aromatic hydrocarbons and some paraffins (olefines $< 1\%$). Larger yields of (III) were obtained from (II) than from (I).

H. G. M.

Beechwood tar from the Polish Carpathians, its composition and value. W. JAKUBOWSKI (Rocz. Farm., 1933, 11, 1—90; Chem. Zentr., 1934, ii, 3462—3463).—The isolation and purification of guaiacol from beechwood tar is described in detail; a full account of the composition of the tar is also given.

H. N. R.

Composition of Fushun shale oil. IV. Properties of fractions 85—115°. V. Hydrocarbons not attacked by bromine at 0° . VI. Olefine hydrocarbons. F. HORIE (J. Soc. Chem. Ind., Japan, 1935, 38, 151—153 B, 153—155 B, 155—157 B; cf. B., 1935, 391).—IV. Fractions boiling over a range of 1° were examined. The doctor test on the fractions before and after reduction indicated the presence of SO-derivatives. I vals. after treatment with $HgCl_2$ solution showed the presence of Δ^7 - and Δ^8 -heptene, $\Delta^{8,9}$ -heptadiene, and γ -methyl- Δ^6 -hexadiene. The mono-olefines were brominated and the unattacked hydrocarbons separated by distillation under reduced pressure.

V. The hydrocarbons were fractionated and their d and n determined. PhMe (2% of total hydrocarbons) was confirmed by nitration and methylcyclohexane by catalytic dehydrogenation. Of the paraffin hydrocarbons (62.5% of total) the main constituent, n - C_7H_{16} , was isolated in the pure state. The presence of γ -ethyl-pentane was indicated.

VI. Physical consts. of the bromides fractionated under reduced pressure were determined, and the hydrocarbons regenerated by reduction. Of the mono-olefines (35.5% of total), oxidation showed that 60—70% was Δ^7 -heptene and 30—40% Δ^8 -heptene. The presence of γ -ethyl- Δ^8 -pentene was suggested.

F. M. E. C.

Cracking three different oils in a Dubbs cracking unit in a continuous process. G. EGLOFF and E. W. NELSON (Petroleum, 1935, 31, No. 12, 3—4).—The flexibility of the Dubbs cracking unit is illustrated by a 26-day continuous run in which gas oil, heavy benzine, a second gas oil, and finally a petrolatum are put through the plant successively for the production of gasoline of C_8H_{18} no. 70.

C. C.

Detection and volumetric determination of alkali metals [in petroleum ash]. R. S. BARNETT (Ind. Eng. Chem. [Anal.], 1935, 7, 183—184).—A hot aq. extract of the ash is added to oleic acid in EtOH until the solution is alkaline. EtOH is evaporated off, and 5 vols. of H_2O are added. The solution is filtered from insol. Ca soaps etc. Alkali metals, if present, make the filtrate froth readily, and give a ppt. with $BaCl_2$. For the determination of Na and K, the ash is evaporated down with H_2SO_4 and strongly ignited. Excess of $Ba(OH)_2$ is added to the residue, converting Na_2SO_4 into NaOH. The filtrate is treated with $(NH_4)_2CO_3$, pptg. Ca, Sr, and Ba. $(NH_4)_2CO_3$ is destroyed by boiling, and NaOH in the solution is titrated with acid.

J. S. A.

Viscosity of petroleum products. Conversion of kinematic viscosity into universal Saybolt seconds. W. B. MCCLUER and M. R. FENSKE (Ind. Eng. Chem., 1935, 27, 82—86; cf. B., 1934, 788).—A graph and table are given for the conversion of kinematic η at 37.78° and 98.89° ($1.7-2266$ centistokes), measured by means of a large modified Ostwald viscometer, into Saybolt seconds (32—10,900).

D. K. M.

"Tensimetry" of hydrocarbons. E. L. LEDERER (Petroleum, 1935, 31, No. 16, 3—8).—The most satisfactory formula for calculating v.p. (p) at temp. T is based on thermodynamical considerations: $\log(p_s/p) = (q/4.571)(T^{-1} - T_s^{-1})$, where T_s = b.p. at atm. pressure p_s , q = mol. heat of vaporisation. Since the quotient of q and T for higher hydrocarbons (I) ($C_{12}H_{26}$, $C_{17}H_{36}$, and $C_{19}H_{40}$) is > 22 , according to the Trouton-Pictet rule, these compounds and a corresponding petroleum fraction (II) must be associated. From a consideration of (I) obtained from γ -sulphonic acids by Pilat (which show a very high degree of association and a negative η index) it is concluded that some relation exists between η and p . The b.p. of (II) under reduced pressure may be represented by a straight line, using semi-log co-ordinates. An expression is given for the p of binary mixtures, and a no. of typical calculation are given with particular reference to steam-distillation. A method is described for determining p in which a known vol. of inert gas, insol. in the oil, is passed through the liquid at a fixed temp. From the amount of vapour evaporated p is calc. An approx. relationship also holds between p and flash point.

C. C.

Absolute colour determination of mineral oil by absorption measurements. E. L. LEDERER (Petroleum, 1935, 31, No. 21, 1—4).—From theoretical considerations of light absorption in the visible spectrum, formulae are derived whereby the colour of an oil is defined by two consts., viz., F_i (colour depth) and F_s (colour cast), which are obtained graphically. F_i is defined as the log of the extinction coeff. (I) at the point of max. intensity in the sun's spectrum (530 m μ), and F_s as the tangent of the angle of the straight line produced by plotting (I) on the special graphical system. As F_s increases, the colour changes from yellow to red, whilst the greater is F_i the darker is the colour. For yellow oils F_i may be negative. The method may be used to follow colour changes in artificially aged oils, e.g., by the Sligh test. The consts. differ with oils of different chemical composition. C. C.

Standardised test of gasoline colour stability. C. D. LOWRY, JUN., M. A. SMITH, and G. B. MURPHY (Ind. Eng. Chem. [Anal.], 1935, 7, 140—143).—Many gasolines when exposed in glass bottles to a "sunshine" C arc are decomposed to the same extent in 40 min. (15 min. in quartz bottles) at a distance of about 1 ft. as they are after exposure for 2 hr. to bright sunlight. The rate of decomp. is unaffected by the temp. J. L. D.

Cold test for fuels. B. H. MOERBEEK and A. C. VAN BEEST (J. Inst. Petroleum Tech., 1935, 21, 155—168).—The temp.-sensitivity (I) of residual fuel oils with respect to their A.S.T.M. pour point (II) is due to the asphaltenes (III). Immunity from (I) can be obtained by removing (III), e.g., by C_5H_{12} or by acid and earth treatment. In practice, fuels are often free-flowing 15—20° below the max. (II). (II) is also affected by the rate of cooling. It is suggested that (III), on cooling from a sufficiently high temp., separate out on the surface of the wax crystals, and prevent the formation of a coherent crystal structure in the fuel. A new method and apparatus (IV) are described in which the fuel is first cooled to 0° and then heated to 35°, at which temp. (III) do not redissolve. (IV) is then gradually cooled. When the fuel has solidified, the temp. is allowed to rise slowly and the actual temp. at which the oil moves 2 mm. under 20 cm. Hg pressure is noted. C. C.

Solidifying point, beginning of liquefaction, and viscosity of automobile oils at low temperatures. J. FORMÁNEK (Chem. Obzor, 1934, 9, 61—63, 81—83; Chem. Zentr., 1934, ii, 4049—4050).—The temp. of incipient melting and η at 0° should be determined as well as the solidifying point. J. S. A.

Recent aviation fuel. E. ENDŌ and H. FURUYA (J. Fuel Soc. Japan, 1935, 14, 35—38).—The C_8H_{18} vals. (V) of aviation and motor gasolines, with or without the addition of $PbEt_4$, were determined by the C.F.R. motor method. No relation was found between V and the hydrocarbon constitution; this is attributed to the fact that the *n*- and *iso*-compounds, which are not separately determined quantitatively, probably differ considerably in anti-knock properties. When the inlet-mixture temp. (T) was high (150°), an "ethylised" fuel was found to be better than one blended with benzol or EtOH. The anti-knock property of standard fuels

decreases as T rises; the higher is the V of the fuel the greater is the effect of T. E. S.

Inhibitor dyes in cracked gasoline. C. D. LOWRY, JUN., G. EGLOFF, J. C. MORRELL, and C. G. DRYER (Ind. Eng. Chem., 1935, 27, 413—415).—The introduction of an azo group into a hydroxy-aromatic compound (of marked inhibiting val.) is detrimental to the inhibiting action (I). An added OH-group increases (I), whilst a NO_2 -group reduces it. Indophenol and phenol-blue (and especially the corresponding leuco-compounds) are very effective antioxidants (II), as are also induline and nigrosine bases. The colour of gasoline (III) + inhibitor dye (IV) gradually fades on exposure, the fading being an indication of inhibitor exhaustion. If a colourless (II), e.g., $\alpha-C_{10}H_7\cdot OH$, and (IV), e.g., $PhN_2\cdot C_{10}H_7\cdot OH$, are both added to (III) an approx. calculation can be made from the colour of (III) of the extent to which each substance has been oxidised. C. C.

Antiknock effect of lead tetraethyl. J. M. CAMPBELL, F. K. SIGNAIGO, W. G. LOVELL, and T. A. BOYD (Ind. Eng. Chem., 1935, 27, 593—597).—The Pb-susceptibility of 62 individual hydrocarbons (I) has been measured by finding the increase in crit. compression ratio (R), in a single-cylinder, variable-compression engine, made possible by adding 1.0 c.c. of $PbEt_4$ (II) per U.S. gal. Although for commercial gasolines the change is relatively small (0.1—0.3 ratio per c.c.), for paraffins and naphthenes (II) is progressively more effective with compounds of higher antiknock val. as measured by R. (II) exhibits a very wide range of effectiveness in changing R of pure (I). With unsaturated aliphatic (I) it is more effective in compounds with a double linking remote from the end of the mol., but the reverse is the case for acetylenic compounds. (II) is very effective in aromatic (I) with saturated side-chains, but less so when the latter are unsaturated, whilst the effect may be negative with compounds containing a triple linking. With successive introduction of double linkings into certain cyclic compounds, e.g., cyclo-hexane, -hexene, -hexadiene, the effect of (II) becomes progressively less. C. C.

Knocking properties of isomeric fuels. M. AUBERT and R. DUCHÊNE (Chaleur et Ind., 1934, 15, 1416—1425; Chem. Zentr., 1934, ii, 3703).—The inflammation of 4 isomeric hexanes has been examined photographically. $n-C_6H_{14}$ knocks readily, *iso*- C_6H_{14} and $CHMeEt_2$ have less pronounced knocking properties, and Pr^s_2 did not knock. The combustion characteristics do not, therefore, depend only on the % composition. H. J. E.

Combustion of gas oils and heavy oils. M. AUBERT, P. CLERGET, and R. DUCHÊNE (Chim. et Ind., 1935, 33, 811—816).—Apparatus is described wherewith the flame produced by injecting oil into a cylinder (C) containing air heated by rapid compression can be photographed on a moving film. For each oil the initial temp. must attain a definite val. before ignition takes place. Ignition occurs at some point in C a few millisecc. after injection and the flame then spreads throughout C at a speed of a few m./sec. On raising the initial temp. a crit. point is reached at which ignition takes place almost simultaneously along the whole

length of C and is followed by a detonation wave which travels to-and-fro at a speed of the order of 1000 m./sec. The delay in ignition increases with advance of the injection. Detonation is diminished by increasing the amount of oil injected, or by injecting MeOH, EtOH, PhCHO, etc. simultaneously with the gas oil.

A. B. M.

Solvent extraction in petroleum refining. J. T. WARD and H. O. FORREST (Chem. Met. Eng., 1935, 42, 246—250).—A review of the refining of lubricating oil by solvent extraction. A list of suitable solvents is given.

D. K. M.

Aromatic constituents of mineral lubricating oils. I. C. ZERBE and K. FOLKENS (Brennstoff-Chem., 1935, 16, 161—165).—A spindle oil derived from an American asphalt-base crude was extracted with liquid SO_2 and the extract (20—30% of the original oil) was fractionated *in vacuo*. Examination of the absorption spectra of the fractions showed that those of lower b.p. consisted of substituted derivatives of $C_{10}H_8$ (and possibly of C_6H_6), and those of higher b.p. of similar derivatives of phenanthrene and higher polycyclic aromatics. The calc. vals. of the ratio aliphatic C : aromatic C fell from 1:1.14 to 1:0.71 as the b.p. of the fractions rose; the vals. of the mol. refractions calc. from these ratios agreed with the observed vals. The constitution of the fractions deduced from the absorption spectra was confirmed by their thermal decomp., which led to the production of the parent hydrocarbons (C_6H_6 , $C_{10}H_8$, etc.). The temp.- η curves of the extract, raffinate, and original oil are compared.

A. B. M.

Relation between the physical properties and chemical composition of mineral lubricating oils. M. FREUND (Petroleum, 1935, 31, No. 19; Motoren-betr., 8, 2—6).—The physical and chemical properties of mineral lubricating oils (I) which have the same η at (e.g.) 50° vary uniformly with the d of the oil, i.e., for paraffinic-, naphthenic-, or asphaltic-base oils. Figures are given for groups of (I) of the same η at 50°; in each group, as d rises, the η curve is steeper, and the NH_2Ph point, the average b.p. (0.1 mm. Hg), the apparent mol. wt., and the H content all decrease uniformly. The Conradson coke val. is generally greater for oils of low d , whilst the latter are more resistant to oxidation. All properties, but particularly the last two, are, however, affected to some extent by minor constituents of (I), e.g., asphalt-forming products, solid paraffin, etc.

C. C.

Paraffin wax. Tensile strength and density at various temperatures. W. F. SEYER and K. INOUE (Ind. Eng. Chem., 1935, 27, 567—570).—Paraffin wax (I) may be either a cryst. or plastic solid, depending on the temp. The tensile strength (T) of (I) was determined over a temp. range below crit. temp. by an apparatus in which one end of a shaped sample (II) was attached to a balance arm, the other end being fixed, and (II) being surrounded by a cooling medium. T was determined by loading the other arm until fracture of (II) occurred. d was obtained by measuring the loss in wt. in H_2O ($> 0^\circ$) or aq. $CaCl_2$ ($< 0^\circ$). The wax examined (m.p. 55°, crit. temp. 30°) showed a max. T

at about 0°. Decrease in T was apparently due to the development of minute cracks. The relationship between d and T was not linear.

C. C.

Determining H_2O and H_2S in gases.—See VII. **Analysis of sulphonated oils.**—See XII. **Rate of detonation of explosives.**—See XXII.

See also A., June, 722, **Infra-red photography of coal.**

PATENTS.

Heating of carbonaceous materials, and formation of charges for such treatment. P. C. REILLY (B.P. 425,720, 12.2.34).—Coal is carbonised by passing hot combustion gases through a charge (I) of the material, within which a no. of channels have been formed in such manner as to distribute the heating medium throughout the (I) and effect uniform heating. In one form of apparatus the (I) is contained in a chamber (C) containing a series of fixed vertical rods (R) and having a movable false bottom by means of which the (I) can be raised at intervals. Hot gases produced by the combustion of fuel in the upper part of C pass down through the channels in the (I) formed by R, and are withdrawn, together with the volatile products of distillation, from the bottom of C. The coke is discharged from the upper part of C by means of a horizontally-moving ram which shears the upper layer from the (I) into an adjacent chamber. Another method of forming channels in the (I) is by introducing therein cardboard tubes filled with coke. Other forms of apparatus are described.

A. B. M.

Low-temperature carbonisation of coal. S. P. MILLER, ASST. to BARRETT Co. (U.S.P. 1,969,472, 7.8.34. Appl., 19.7.30).—Coal is carbonised in a horizontal rotary, vertical, or other suitable type of retort (R) by being brought in direct contact with the hot gases and vapours leaving coke ovens or other high-temp. carbonisation plant. The resulting volatile products are cooled, preferably after being freed from suspended impurities by electrical pptn., to give a blended high- and low-temp. tar. The coal may be preheated in a separate chamber before it is charged into R.

A. B. M.

Charging means for coke ovens. G. J. GREENFIELD, THORNCIFFE COAL DISTILLATION, LTD., and WOODALL-DUCKHAM (1920), LTD. (B.P. 427,678, 4.4.34).—A method of operating the movable sleeve which connects a hopper truck to the top of a coke oven is described.

B. M. V.

Coke and gas manufacture. G. J. NORDMEYER, ASST. to KOPPERS Co. OF DELAWARE (U.S.P. 1,973,909, 18.9.34. Appl., 24.9.31).—Gas is manufactured from oil in coke ovens at times when the demand for gas is $>$ that for coke. The oil is admitted through heat-resisting pipes extending downwards from the top to near the bottom and terminating in sprays; a pile of oil coke and oil is built up and simultaneously steamed, preferably from other interior jets.

B. M. V.

Quenching of hot coke. F. W. SPERR, ASST. to KOPPERS Co. OF DELAWARE (U.S.P. 1,973,913, 18.9.34. Appl., 26.8.30).—Waste liquors containing PhOH,

e.g., those from the NH_3 still, are used for quenching purposes and the process is completed with clean H_2O .

B. M. V.

Production of activated carbon. J. C. MORRELL (U.S.P. 1,968,845, 7.8.34. Appl., 4.12.30).—Finely-divided hardwood charcoal is mixed with an aq. emulsion of a binder made by combining a suspension of hard pitch in a solution of casein in dil. alkali with an emulsion of tar oil in a similar medium (cf. U.S.P. 1,440,355—6; B., 1923, 704 A); the mixture after separation of H_2O is then compressed, comminuted, and charred. The product is activated by treatment with steam and is finally washed with dil. acid.

A. B. M.

Treatment [destructive hydrogenation] of coals, tars, mineral oils, and the like. M. PIER, Assr. to STANDARD-I. G. Co. (U.S.P. 1,969,422, 7.8.34. Appl., 29.11.30. Ger., 3.12.29).—Apparatus for the treatment of carbonaceous materials containing S with high-pressure H_2 at elevated temp. is constructed of a H_2 -resistant alloy steel containing 1–6% of Cr, alone or together with other elements (*e.g.*, W or V), provided with a S-resistant lining of Zn, Zn alloy, Al, etc.

A. B. M.

Gas detector. C. H. LEWIS, Assr. to COLUMBIA ENG. CORP. (U.S.P. 1,974,498, 25.9.34. Appl., 17.6.32).—A lamp, protected from causing explosions on the Davy principle, has a graduated chimney for measuring the flame and in the base are absorbents for selectively removing constituents from the ingoing air. A hand-operated aspirator and cocks are provided to send the air either direct to the flame or through any desired absorbent.

B. M. V.

Concentration of gas liquor. T. O. WILTON (B.P. 428,065, 2.11.33).—The liquor is passed through a decarbonating still (A) before it enters the ordinary gas-liquor still (B). The steam supply to A is automatically controlled by a thermostatic device so that the liquor is maintained at 70–85° and the max. amount of CO_2 and min. amount of H_2S are expelled. The NH_3 , H_2S , and residual CO_2 are expelled in B and passed to the condenser. If desired, a third still section may be provided in which fixed NH_3 is released by liming.

A. B. M.

Manufacture of aqueous dispersions [of bitumen]. L. KIRSCHBRAUN, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,969,308, 7.8.34. Appl., 13.11.30).—Bitumen is dispersed in H_2O containing an inorg. emulsifying agent, *e.g.*, bentonite, by agitation at a suitable temp., and the product, which is of paste-like consistency, is cooled and then subjected to a beating or whipping action until the desired degree of fluidity is obtained.

A. B. M.

Cracking of hydrocarbons by pressure heating in the liquid phase. C. STILL G.M.B.H. (B.P. 428,108, 1.2.34. Ger., 1.2.33).—Hydrocarbons, especially coal and lignite tars, are cracked in the liquid phase by heating under pressure followed by expansion. The cracked products from the expansion jet, immediately after heating to the cracking temp., impinge on an oppositely disposed, inclined, and substantially plane baffle plate (B) over which is conducted a rinsing fluid (R) (*e.g.*, residue from the distilling column), whereby

the liquid is partly distilled by the heating action of the expansion products. R may be recycled over B until pitch is formed.

C. C.

Production of hydrocarbons of low b.p. by hydrogenation of vapours obtained by distilling or cracking oils, tars, and similar hydrocarbons.

A. VONK (B.P. 428,217, 3.11.33).—The oil or tar is cracked or distilled and the vapours, mixed with a gas (G) containing H_2 , are passed through a purifier (P) for the removal of the S compounds and then through a chamber containing a hydrogenating catalyst, *e.g.*, Ni, V, or Co. In P the hot gases and vapours make contact successively with Fe, Cu, and Ni; the spent purifying material is revived by oxidation with air followed by reduction with G. G may be produced by the action of steam at 700–800° on the coke formed in the cracking stage. Oxygenated compounds, *e.g.*, phenols, are reduced to the corresponding aromatic hydrocarbons by passing the mixed gases and vapours over calcined cuprene at about 360°.

A. B. M.

Heat-treatment and/or vaporisation of hydrocarbon distillates and residues. HOUDRY PROCESS CORP., Assees. of E. J. HOUDRY (B.P. 428,416, 25.4.34. U.S., 13.5.33).—Hydrocarbon oil preheated to 315° is atomised, *e.g.*, with steam at 455°, and the atomised charge is distributed over inert, porous, absorbent material (I). Oil vapours are carried away by the gaseous vehicle and tar or pitch remains on (I), which is ultimately regenerated by oxidation. Two treating units are used in adjacent chambers alternately on stream and in process of regeneration. Heat produced in the latter process is used to vaporise the charge in the other set.

C. C.

Treatment of hydrocarbon oils. G. EGLOFF and J. C. MORRELL, Assrs. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,969,302, 7.8.34. Appl., 16.9.33).—In the refining of low-boiling hydrocarbon distillates, vapours thereof, with or without steam, are treated at 121–315° with phosphoric acids in presence of salts of metals having a mild oxidising action, *e.g.*, chromates, hypochlorites, or permanganates of Al, Zn, Cu. Gases containing O_2 may also be added.

C. C.

Treatment of hydrocarbon oils. J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,969,316, 7.8.34. Appl., 19.12.31).—Cracked petroleum distillates are made stable to colour and gum formation and to knock-rating by treatment in the vapour phase with an aq. solution containing H_2SO_4 (30–60%) and < 4% (5–30%) of an alkali sulphate, with or without an alkaline-earth sulphate.

C. C.

Treatment of (A) hydrocarbons, (B) sludge. W. M. MALISOFF, Assr. to ATLANTIC REFINING CO. (U.S.P. 1,968,842—3, 7.8.34. Appl., [A] 3.11.30, [B] 22.8.32).—(A) Mercaptans (I) are removed from light hydrocarbon fractions (II) and from gas oil by treatment with alkali hydroxide dissolved in org. solvent (S), *e.g.*, the lower alcohols or ketones, glycol, etc. Sufficient H_2O (> 15%), urea, or inorg. salts is added to (II) to render S immiscible therewith. (B) Volatile S is removed from mineral oil sludge (at < 150°) and the residue subjected to steam (at > 150°) or other reagent to hydrolyse the

components. (I) etc. are vaporised with the steam and alkaline compounds separated from the residue.

C. C.

Refining of [hydrocarbon] oils. F. W. HALL, Assr. to TEXAS Co. (U.S.P. 1,969,694, 7.8.34. Appl., 24.9.30).—Cracked petroleum distillates, after acid treatment, are neutralised in 2 stages: (a) with an aq. suspension of alkaline-earth carbonate to remove inorg. acids, and (b) with aq. caustic alkali to remove org. acids. From (b) petroleum phenolic substances are recovered.

C. C.

Removal of wax from hydrocarbon oils. G. R. BRYANT and F. X. GOVERS, Assrs. to INDIAN REFINING Co. (U.S.P. 1,969,201, 7.8.34. Appl., 17.3.32).—Hydrocarbon oil containing wax is mixed with solvent, e.g., 65% of benzol and 35% of COMe_2 , and the mixture chilled to -18° and transferred to a filtering zone by means of fluid pressure without intermediate pumping, so that the crystal structure is not disturbed.

C. C.

Removal of wax from hydrocarbon oil. B. Y. MCCARTY and W. E. SKELTON, Assrs. to TEXAS Co. (U.S.P. 1,969,670, 7.8.34. Appl., 30.11.31).—Solid paraffins are removed from lubricating oil fractions (I) by dissolving (I) in a mixture of amylene dichloride and COMeEt . The solution is chilled to -23° and filtered, with or without filter-aid.

C. C.

Refining of cracked gasoline. K. J. SMITH, Assr. to SKELLY OIL Co. (U.S.P. 1,969,047, 7.8.34. Appl., 10.1.30).—Gasoline (G) from vapour-phase cracking is added to a system in which oil (of b.p. $>$ that of G and in which gum and gum-forming constituents are sol.) is circulating at > 1 atm. through a heating zone at $> 343^\circ$ but below cracking temp. Vapours are continually removed and fractionated. Refined G is collected and the residue returned for recirculation.

C. C.

Separation and recovery of olefines from [hydrocarbon] gases containing the same. DISTILLERS Co., LTD., W. P. JOSHUA, and H. M. STANLEY (B.P. 428,106, 26.1.34).—Olefines (I) are removed from hydrocarbon gas mixtures (after removal of C_2H_2) by washing with a solution of a Cu^I salt in an aq. hydroxyalkylamine (1 mol. per atom of Cu). The temp. is not allowed to rise. (I) are recovered by heating the solvent or reducing the pressure.

C. C.

[Blending of] petroleum and like hydrocarbons. STANDARD OIL DEVELOPMENT Co. (B.P. 428,410, 4.4.34. U.S., 6.6.33).—Solid hydrocarbon polymerides (I), obtained by condensing a saturated dihalogeno-derivative of an aliphatic hydrocarbon ($< \text{C}_5$) with a cyclic hydrocarbon at 20 – 50° in presence of a catalyst, e.g., AlCl_3 , are blended with petroleum hydrocarbons, e.g., gasoline, kerosene, Diesel oil, and lubricating oil (II), particularly (II), to increase η . Paraffin wax is thus made more plastic. (I) may be made more sol. by hydrogenation and/or alkylation.

C. C.

Hydrogenation of organic substances [lubricating oils]. G. HUGEL, M. PAUL, and M. BOISTEL, Assrs. to Soc. l'ETUDE CHIM. APPL. (S.E.C.A.) (U.S.P. 1,968,208, 31.7.34. Appl., 1.8.27. Ger., 28.2.27).—Hydrogenation of distillation products of coal and petroleum (pitch) is catalysed by alkali or alkaline-earth hydrides (10%) (at

$> 300^\circ / < 100$ kg.) which are indifferent to nitrogenous, sulphidic, arsenated, and oxygenated poisons, and stabilised by hydrocarbons (tetralin) or the above metal amides (NaNH_2). Apparatus is claimed. A. W. B.

Surface-tension dialysis [of lubricating oil]. L. CAMMEN, Assr. to P. DAVIE (U.S.P. 1,974,235, 18.9.34. Appl., 18.10.32).—Oil or the like is dialysed from H_2O or other impurities through a cylindrical wall formed with a multitude of foramina any diam. of which is < 0.01 in. and length < 0.08 in.

B. M. V.

Production of low-b.p. hydrocarbons. J. C. BLACK, Assr. to GASOLINE PRODUCTS Co., Inc. (U.S.P. 1,970,553, 21.8.34. Appl., 4.3.30. Renewed 19.10.32).

Washing coal. Separating dirt from coal.
Distilling crude oil. Gas and liquid separator.—See I. Olefine derivatives. sec.-Alcohols from olefines. Splitting up liquid mixtures. Unsaturated org. halogenated compounds. Phthalimide.—See III. Cold-laid pavement.—See IX. Resistance material. Protecting pipes etc.—See XI. Oil-sol. resin.—See XIII. Road-tar mixtures. Oil-resistant rubber.—See XIV.

III.—ORGANIC INTERMEDIATES.

Chlorination of methane. M. GIORDANI (Annali Chim. Appl., 1935, 25, 163–173).—To utilise the natural CH_4 of N. Italy and that formed during the fermentation of sewage sludge, the gas is treated with Cl_2 at 450° in presence of CuCl containing 1% of CeCl_3 , MeCl being obtained in 89% yield.

T. H. P.

Analysis of *n*-butyl alcohol, acetone, and ethyl alcohol in aqueous solution. L. M. CHRISTENSEN and E. I. FULMER (Ind. Eng. Chem. [Anal.], 1935, 7, 180–182).—A solution (I) containing Bu^nOH (II), COMe_2 (III), and EtOH (IV) with $\text{K}_2\text{Cr}_2\text{O}_7$ and conc. H_2SO_4 at 100° during 10 min. liberates I (from KI), which is titrated. Following the same procedure on (I), previously “partitioned” with CCl_4 , and again (I) oxidised under different conditions, the concns. of (II) and (IV) are calc. (III) is determined by Goodwin's method (cf. A., 1920, ii, 273).

J. L. D.

Determination of true high-molecular sulphonic acids in textile and tanning agents. K. LINDNER (Chem.-Ztg., 1935, 59, 388–389).—The determination of fatty sulphonic acids (I) as distinct from sulphuric esters (II) is effected by the following processes: solvents are steam-distilled off and the residue is freed from salts by extracting with EtOH . Soaps and (II) are hydrolysed by boiling HCl and the acids extracted with Et_2O . Fatty alcohols from the esters are determined by extraction with light petroleum after hydrolysis. Methods of identifying the (I) are briefly reviewed.

D. R. D.

Detection of benzene in alcohol. A. C. LANSING (Ind. Eng. Chem. [Anal.], 1935, 7, 184–185).—From EtOH (40 c.c.), CCl_4 -aq. Na_2SO_4 extracts C_6H_6 ($< 0.01\%$), the NO_2 -derivative of which is determined by the intensity of its colour reaction with NaOH . Chlorides and oxidisable material interfere.

J. L. D.

Colour reactions and spectrophotometric determination of the nitronaphthalenes. B. FEDOROV and

A. SPRYSKOV (Z. anal. Chem., 1935, 101, 188—193).— $1\text{-C}_{10}\text{H}_7\text{NO}_2$ (I) gives with conc. H_2SO_4 a red, and $2\text{-C}_{10}\text{H}_7\text{NO}_2$ (II) a yellow, colour destroyed on dilution. To determine (I), an approx. 0.1% solution is examined spectro-photometrically with light of 580 $\text{m}\mu$, and (I) and (II) present are calc. from the extinction coeff. In $\text{C}_5\text{H}_5\text{N}$, 1:8- and 1:5-, but not 2:4- $\text{C}_{10}\text{H}_6(\text{NO}_2)_2$ give red-brown or yellow-brown colorations on addition of EtOH-NaOH . (I) and (II) give a yellow colour on warming. J. S. A.

Naphthenic acids. I. VON BRAUN (Chem.-Ztg., 1935, 59, 485—488).—A review.

Analysis of complex gaseous mixture. [Guaiacol from] beechwood tar.—See II. Corrosion of silumin.—See X. [Products from] beet-pulp fermentation.—See XVIII. $\text{C}_8\text{H}_{11}\text{OH}$ for milk analysis.—See XIX.

See also A., June, 709, **Electrochemical chlorination of C_6H_6 .** 742, **Simultaneous dehydration of EtOH and (a) NH_3 , (b) NH_2Ph .** Catalytic prep. of NHPHt . 743, **Prep. of $(\text{NHPH})_2$.** 744, **4-Chloro-2-nitro- and -2-amino-phenol.** *p*-Methylamino-phenol. Prep. of 1-alkyl- β -naphthols. 750, **Prep. of vanillin.** 763, **Benzanthrone derivatives.**

PATENTS.

Splitting up a liquid mixture into its components or groups of components. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 424,867, 23.5.33 and 23.6.34. Addn. to B.P. 417,617; B., 1935, 4).—The process of the prior patent for separation of mixtures of *A* and *B* is improved by washing the solution of the extract with a liquid consisting substantially of *A*, the washing liquor and extracting agent being introduced at opposite ends of the column. A. W. B.

Manufacture of methyl chloride. J. Y. JOHNSON. From I. G. FARBEIND. A.-G. (B.P. 427,738, 21.10.33).— MeOH (I) interacts with HCl (II), (I) being in 2—20% excess of (II), in presence of aq. ZnCl_2 solution (III), e.g., 65—70%, at 100—200° (125°). (I), in the liquid phase at about 4 atm. or the vapour phase at $>$ b.p. of (I), should be introduced into (III) separate locally from (II) (simultaneously). A. W. B.

Manufacture of olefine chlorides. J. Y. JOHNSON. From I. G. FARBEIND. A.-G. (B.P. 425,061, 2.11.33).—Interaction of Cl_2 with olefines in industrial gas mixtures, e.g., gases from coal, in liquids dissolving both Cl_2 and olefines, e.g., $\text{C}_2\text{H}_4\text{Cl}_2$, $\text{C}_2\text{H}_3\text{Cl}_3$, C_2HCl_5 , is improved by the presence, as catalysts, of chlorides of elements, except C, of groups IV—VII (sol. in the liquids), e.g., SbCl_5 , BiCl_3 , ICl , PCl_5 , S_2Cl_2 , SnCl_4 , and MnCl_2 . The Cl_2 and gas are passed together (avoiding explosive mixtures by adjusting concn. where necessary) into the liquid containing catalyst (20° $<$ 1 atm.) externally cooled. A. W. B.

Production of organic fluoro-compounds. L. C. HOLT and E. L. MATTISON, ASSRS. to KINETIC CHEMICALS, INC. (U.S.P. 1,967,244, 24.7.34. Appl., 31.8.32).— HF (vapour phase) is passed into aralkyl halides (chlorides) in absence of catalyst at $<$ 80° (110—170°); e.g., CPhCl_3 gives CPhFCl_2 , CPhF_2Cl , and CPhF_3 . A. W. B.

Production of halogeno-vinylacetylene. R. A. JACOBSON, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,864, 24.7.34. Appl., 23.2.33).—By treatment of monovinylacetylene with appropriate alkali hypohalite in the cold (0°) the following are prepared: α -bromo-, b.p. 52—53°/217 mm., α -iodo- (I), b.p. 78°/125 mm., and α -chloro- β -vinylacetylene, b.p. 55—57°. All form explosive polymerides readily [especially (I)]. A. W. B.

Production of polymerised halogenated hydrocarbon. W. H. CAROTHERS, A. M. COLLINS, and J. E. KIRBY, ASSRS. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,860, 24.7.34. Appl., 28.2.31).— β -Chlorobutadiene (I) is polymerised in presence of solvents (inert; e.g., C_6H_6 , xylene, vaseline, cottonseed oil, shellac, stearic acid, isoprene, EtOH). Control of (a) polymerisation and/or (b) consistency of the polymeride is effected. Solutions obtained are adaptable for coating compositions, plastics, etc. A. W. B.

Nitration of paraffin hydrocarbons. H. B. HASS, E. B. HODGE, and B. M. VANDERBILT, ASSRS. to PURDUE RES. FOUNDATION (U.S.P. 1,967,667, 24.7.34. Appl., 4.10.33).—Aliphatic hydrocarbons (I) (*tert.*) having C_3 — C_8 are treated with HNO_3 in the vapour phase at $>$ the crit. temp. of (I); e.g., *iso*- C_4H_{10} with HNO_3 at 135—145°/600—2400 lb. per sq. in. gives $\text{Bu}^\text{t}\text{NO}_2$. Apparatus is claimed. A. W. B.

Production of condensation products of acetylene. W. MITCHELL, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 428,080, 7.11.33).—Org. OH-compounds, e.g., lower aliphatic alcohols, glycols, glycerol, or phenols, are caused to react with C_2H_2 in presence of freshly pptd. HgSO_4 [by pptg. $\text{Hg}(\text{OAc})_2$ with conc. H_2SO_4 and washing free from acid] in absence of mineral acid. Reduction of tar formation, thus allowing higher working temp., is claimed. A. W. B.

Manufacture of alcohols. J. CRISTESCU (B.P. 427,221, 16.3.34. Rum., 17.3.33).—Gases containing H_2 , CH_4 , or other hydrocarbons are mixed with gases containing O_2 , air, or an oxide of C, one or both gases containing a C compound, and passed into boiling H_2O at 1 atm. in presence of catalysts (I), e.g., metallic oxides other than CaO , e.g., CuO , PbO_2 , Al_2O_3 , Cr_2O_3 , ZnO , CoO , and/or metal powders, e.g., Al, or charcoal or coke washed with alkali; the mixture of gases and steam is then passed into a further chamber containing (I). A. W. B.

Production of [secondary] alcohols from olefines. W. ENGS and R. MORAVEC, ASSRS. to SHELL DEVELOPMENT Co. (U.S.P. 1,967,399, 24.7.34. Appl., 1.6.31).—Cracked petroleum oils, from which olefines capable of hydrating to *tert.*-alcohols have been removed, are sulphonated below 27° with 85—100% H_2SO_4 , converting the olefines present into alkyl H sulphates. Unchanged paraffins are separated, the acid layer is diluted, dialkyl sulphates are separated, and the *sec.*-alcohols, e.g., $\text{Bu}^\text{t}\text{OH}$, isolated from the dil. acid layer by hydrolysis. A. W. B.

Manufacture of monoethers of glycols [solvents]. K. R. EDLUND, ASSR. to SHELL DEVELOPMENT Co. (U.S.P. 1,968,032, 31.7.34. Appl., 13.10.31).—

tert.-Base olefines (≤ 40) are converted into halo-hydrins and then into alkylene oxides by successive treatment with HOHal and caustic alkali. These, with anhyd. alcohols, yield ethers of glycols; *e.g.*, isobutylene oxide with MeOH or EtOH gives α -Me₂ glycol Me₁, b.p. 142°, and Et₁ ether, b.p. 147.8°.

A. W. B.

Manufacture of sulphonation products. [Wetting, emulsifying, etc. agents.] W. J. TENNANT. From HENKEL & Co. G.M.B.H. (B.P. 424,891, 26.8.33).—*tert.*-Alcohols (≤ 1 aliphatic chain of $\leq 8C$ and/or ≤ 1 cycloaliphatic residue) are sulphonated in presence of dehydrating agents, *e.g.*, Ac₂O, SO₃, to give stable products; *e.g.*, C₁₁H₂₃·C(Et)₂·OH, C₁₈H₃₇·C(Me)₂·OH, or other carbinols from the action of RMg·Hal on natural oils or waxes, *e.g.*, soya oil, carnauba wax, are sulphonated (0–15°).

A. W. B.

Manufacture of detergent, cleansing, emulsifying, and dispersing agents. CHEM. WORKS, FORMERLY SANDOZ (B.P. 428,156, 29.3.34. Switz., 1.4.33).—Solid or fluid waxes, *e.g.*, spermaceti, or spermaceti oil, are sulphonated, *e.g.*, with H₂SO₄, oleum, in presence of polyhydric alcohols, *e.g.*, glycerol, or with the products of sulphonation of such alcohols, *e.g.*, crude glycerol sulphuric ester, at 20–60°.

A. W. B.

Manufacture of detergents and wetting-out agents. HOWARDS & SONS, LTD., J. W. BLAGDEN, and G. C. H. CLARK (B.P. 425,239, 22.9.33).—*cyclo*-Hexyleyclohexanols or homologues, from cyclohexanone or homologues (cf. B.P. 397,883; B., 1933, 955) or by hydrogenation of hydroxydiphenyls, are sulphonated (at $\leq 15^\circ$).

A. W. B.

Aqueous liquids for use in the textile, fur, and leather industries. HENKEL & Co. G.M.B.H. (B.P. 427,899, 2.11.33. Ger., 7.12.32).—The use of compounds of the type R·X·R'·CO₂H, where R is an aliphatic or cycloaliphatic residue of $\leq C_8$, R' an aliphatic residue of $\geq C_6$, and X is O, S, or SO₂, or their salts, *e.g.*, Na, K, or N(C₂H₄·OH)₃, as frothing, cleansing, levelling, impregnating, stabilising, dissolving, and distributing agents is claimed. Examples are Na dodecylmercaptoacetate, Na dodecylsulphonacetate (cf. B.P. 401,118 and 412,305; B., 1934, 54, 751), and the salts of glycollic acid etherified with the mixed alcohols obtained by hydrogenation of coconut oil fatty acids.

A. W. B.

Emulsion [manufacture]. H. J. BARRETT and G. L. DOROUGH, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,220, 24.7.34. Appl., 1.4.33).—The use as emulsifying agents (for polymerised β -chlorobutadiene) of H₂O-sol. salts [Na, NH₄, N(C₂H₄·OH)₃] of (fatty acid-modified) glyptal resins is claimed.

A. W. B.

Hydrolysis of alkyl sulphate esters for production of alcohols and ethers. N. A. SARGENT (B.P. 427,223, 23.3.34. U.S., 12.5.33).—The process of converting dialkyl sulphates, or mixtures of these with alkyl H sulphates, obtained by treatment of mixed olefines, $\geq C_3$, with H₂SO₄, into ethers and alcohols is improved, by rapid 2-stage hydrolysis, by mixing with approx. an equal wt. of H₂O to give a

fine emulsion, vigorously agitating at 70–75° for 20 min.—1 hr., followed by distillation until the distillate has *d* 0.999.

A. W. B.

Manufacture of organic ethers. BRIT. CELANESE, LTD. (B.P. 424,837, 23.8.33. U.S., 23.8.32).—Aliphatic methylene ethers are prepared by interaction of partly etherified polyhydric alcohols (monoalkyl ethers of glycols) with CH₂O or the equiv., using acid condensing agent, *e.g.*, FeCl₃ or mineral acid; thus ethylene glycol Me ether gives *bis*-(β -methoxyethyl) methylene ether, b.p. 197–205°. Uses as solvents, softeners, and plasticisers for cellulose esters (acetone-sol. acetate) are claimed.

A. W. B.

Preparation of olefine derivatives. K. EDLUND and T. EVANS, Assrs. to SHELL DEVELOPMENT CO. (U.S.P. 1,968,601, 31.7.34. Appl., 14.2.34).—Mixed olefines (cracked petroleum products) are freed from *tert.*-base olefines by reacting (at $\geq 95^\circ$) with alcohols (primary or *sec.*), *e.g.*, MeOH, Pr²OH, using as catalysts metallic chlorides or acids (H₂SO₄, 75–100%). The ethers obtained are removed by fractionation.

A. W. B.

Manufacture of organic acids from aldehydes and primary alcohols. W. J. HALE and H. STREETS (B.P. 427,631, 18.10.33).—Mixtures of aldehyde or alcohol with ≤ 1 mol. of H₂O are brought in contact, at $\geq 300^\circ$ (280°), with a finely-divided dehydrogenating catalyst, effective at $\leq 300^\circ$, *e.g.*, Cu, Ag, Co, Zn, Pd, and the Pt metals, and a directive catalytic base comprising a partly hydrolysable salt of an amphoteric base, *e.g.*, Cu, Be, Mg, Zn, Al, Ga, La, Yt metals, Zr, Ce metals, Cr, U, Mn, Fe, Co, or Ni, or of Mg and an org. acid. O₂ and O-supplying materials are excluded. The yield is practically quant. with aliphatic compounds, but lower with aromatic. The process is one of hydration, forming an aldehydrol, followed by dehydrogenation, and is operative with unsaturated hydrocarbons, *e.g.*, C₂H₄, C₂H₂, but gives low yields.

A. W. B.

Concentration of formic acid. R. KOEPP & Co. CHEM. FABR. A.-G. (B.P. 427,079, 1.10.34. Ger., 30.9.33).—Very highly conc. HCO₂H (I) is obtained from aq. solutions of any concn. by combining with a weak base (aromatic or heterocyclic), *e.g.*, NPhMe₂, C₅H₅N, to form an acid or neutral salt, distilling off the H₂O with the aid of an auxiliary liquid (II) [practically immiscible with cold (I) and H₂O], *e.g.*, PhMe, followed by azeotropic distillation of the (I) with (II); the b.p. of the base should be $>$ that of the azeotropic mixture of H₂O and (II).

A. W. B.

Manufacture of esters from acetylene. C. F. BOEHRINGER & SOEHNE, G.M.B.H. (B.P. 427,448, 14.3.34. Ger., 15.3.33 and 28.2.34).—The process of B.P. 308,169 (B., 1931, 12) for the manufacture of ethylidene diacetate (I) and vinyl acetate (II) from C₂H₂ and AcOH is made less hazardous without reduction of yield by substitution of the SO₃ catalyst by a Hg salt of an org. disulphonic acid (III), *e.g.*, methionie (IV) or benzenedisulphonic acid, but excepting aldehydedisulphonic acids; (III) must be in excess over the Hg, *e.g.*, 6.5 g. of HgO : 17.5 g. of 69% (IV), but (III) cannot be used free from Hg. For the prep. of (I) temp. of 60–100°, and for (II) 30–45°, are used.

A. W. B.

Manufacture of maleic anhydride from crude maleic acid. M. N. DVORNIKOFF, Assr. to MONSANTO CHEM. CO. (U.S.P. 1,966,853, 17.7.34. Appl., 3.2.34).—Crude maleic acid is distilled at $\geq 135^\circ / < 1$ atm. (110°/50–60 mm.) and the H_2O and anhydride formed are separated by fractional condensation. A. W. B.

Production of esters of methacrylic [α -methylacrylic] acid. J. W. C. CRAWFORD, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 427,810, 31.10.33. Addn. to B.P. 405,699; B., 1934, 313).— $OH \cdot CMe_2 \cdot CN$ is added to (98%) H_2SO_4 or oleum containing an antioxidant (S) at 80–100°, the product heated at 100–140° (1 hr.), H_2O [≥ 4 (2) mols.] added, the mixture again heated at 100–140° (3 hr.), and finally the appropriate alcohol (I) added and esterification carried out at the b.p. Alternatively, H_2O and (I) are added together.

H. A. P.

Production of esters of unsaturated monocarboxylic aliphatic acids. E. I. DU PONT DE NEMOURS & Co. and D. J. LODER (B.P. 428,223, 9.11.33).—Halogenated saturated aliphatic acids of $\leq C_8$ or, preferably, their esters, are passed in the vapour phase over SiO_2 gel at 300°/1 atm. Examples are: Me chloroisobutyrate \rightarrow Me methacrylate, $CH_2Cl \cdot CH_2 \cdot CO_2H \rightarrow CH_2 \cdot CH \cdot CO_2H \rightarrow$ esterified \rightarrow Me acrylate.

A. W. B.

Manufacture of anhydrous citric acid. CHEM. FABR. J. A. BENCKISER G.M.B.H. (B.P. 425,075, 1.5.34).—Avoidance of crystallisation of the hydrated form from concns. of $d 1.49$ is effected by running the inspissated product into an aq. solution containing 18 kg. of cryst. citric acid and 25 litre of conc. H_2SO_4 per 100 litres of solution, stirring till cool, and centrifuging; yield = 75% of the citric acid introduced.

A. W. B.

Production of guanidino-fatty acids. S. FISCHL, Assr. to SCHERING-KAHLBAUM A.-G. (U.S.P. 1,967,400, 24.7.34. Appl., 11.3.31. Ger., 27.3.30).—S-Alkylthiocarbamide salts are treated (at $< 15^\circ$) with NH_2 -fatty acids or their salts, e.g., HCl , in presence of NH_3 ; e.g., S-methylisothiocarbamide, $\frac{1}{2}H_2SO_4$ (I) + sarcosine hydrochloride \rightarrow creatine; (I) + $NH_2 \cdot CHEt \cdot CO_2H \rightarrow \alpha$ -guanidino-*n*-butyric acid (yields 70–80% of theory).

A. W. B.

Stabilisation of aqueous formaldehyde solutions. E. I. DU PONT DE NEMOURS & Co. (B.P. 427,423, 24.10.33. U.S., 24.10.32).—Aq. solutions of formaldehyde, e.g., of 37% concn., are stabilised against pptn. of polymeride by addition of H_2S (5–10% on the solution), avoiding approach to saturation of the solution with H_2S . Stabilisation can be effected at pH 2–8 and down to 5°; other stabilisers, e.g., 0.5% of $MeOH$, may be used in addition.

A. W. B.

Manufacture of acetaldehyde from acetylene. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 425,069, 27.12.33).— C_2H_2 or gases containing it are passed (at high temp., e.g., 140°) through conc. aq. solutions of neutral salts which react acid in conc. solution, e.g., Zn , Cd , Cr salts (cf. B.P. 313,864; B., 1929, 708), the residual gases being then catalytically hydrated, e.g., at 300–400° over Al , W , and Zn oxides (81:14:5).

A. W. B.

Oxidation of alcohols [to aldehydes]. H. A. BOND and L. B. SMITH, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,968,552, 31.7.34. Appl., 15.4.30).—Lower alcohols ($MeOH$, $EtOH$, etc.) are oxidised (air, at $> 500^\circ$), using catalysts ("electrolytic Ag crystals") impregnated with oxides [≥ 10 (I)%] of W , V , Ce , Th , Mo , Cr , Al , or Zn .

A. W. B.

Manufacture of methyl vinyl ketone. R. F. CONAWAY, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,225, 24.7.34. Appl., 26.8.32).—Hydration of monovinylacetylene (I) with the aid of a Hg^{II} salt in dil. acid solution is improved by presence of an oxidising agent, e.g., $Fe_2(SO_4)_3$, Fe_2O_3 , $CuSO_4$, chromates, manganates, vanadates, and an alkali bisulphite; the product is distilled in presence of a polymerisation inhibitor, e.g., quinol, pyrogallol, pyrocatechol, eugenol, guaiacol. Thus (I) is passed (at 50–85°) into a mixture of HgO , $KHSO_4$, $Fe_2(SO_4)_3$, H_2SO_4 , and H_2O , quinol is added, and the mixture distilled.

A. W. B.

Manufacture of anhydrous chlorethane. M. S. CARPENTER, Assr. to GIVAUDAN-DELAUNAY, INC. (U.S.P. 1,967,287, 24.7.34. Appl., 1.4.32).—Hydrated chlorethane is dried by heating (100°) with dehydrating agents which retain H_2O at 100° or above, e.g., CaO , $CaCl_2$, $MgCl_2$; the anhydride is decanted off.

A. W. B.

Manufacture and application of detergent compounds. E. I. DU PONT DE NEMOURS & Co. (B.P. 428,142 and 428,148, [A] 6.11.33, [B] 8.11.33. U.S., [A] 4.11.32, [B] 8.11.32).—(A) Amines of the formula $C_nH_{n+2}(OH)_{n-1}NHR$, in which n is 5 or 6 and R is H or alkyl (cf. B.P. 426,062; B., 1935, 539), are condensed with an alkyl halide having $\leq C_8$. E.g., *N*-methylglucamine (15 pts.) is heated with cetyl chloride (24 pts.), Na_2CO_3 (12 pts.), $EtOH$ (15 pts.), C_6H_6 (15 pts.), and KI (trace) at 150° in an autoclave to give methylcetylglucamine (I); methyl-lauryl- and -cetylglucamine (+ some dicetylglucamine) are similarly prepared. These are H_2O -sol.; their hydrochlorides have detergent properties, particularly in hard H_2O or acids. (B) The above are converted into quaternary NH_4 salts which have similar detergent action, but are stable to aq. alkalis in addition to acids and Ca salts. Examples are the methiodide and ethiodide of (I).

H. A. P.

Manufacture of halogenoamine alkylsulphuric esters or alkylsulphonic acids. [Bleaching agents.] I. G. FARBENIND. A.-G. (B.P. 427,943, 27.8.34. Ger., 29.8.33).—Compounds capable of splitting off halogens readily are obtained by interaction (at $\geq 40^\circ$) of halogens (I) (Cl_2), or compounds capable of yielding (I), e.g., $NaOCl$, with amines containing, directly attached to N , ≤ 1 H atom and 1 alkylene group bearing a sulphuric ester or SO_3H group, e.g., $R \cdot NH[CH_2]_n \cdot SO_3H$, where R may be H or an aliphatic or aromatic radical, or their salts, in solvents inert towards (I), e.g., $AcOH$, $CHCl_3$, CCl_4 , or in aq. media, in presence of $CaCO_3$, ZnO , or $NaOAc$; either the acid-binding agent or the solvent must contain O . The products (constitution unknown) are H_2O -sol. and relatively stable when dry, liberating (I) readily on warming in aq. solution.

A. W. B.

Manufacture of organic sulphur compounds. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P.

427,903, 25.11.33).—Mercaptans are heated at 50–300° with C_2H_2 and basic metal compounds (forming vinyl thio-ethers, CH_2CH_2SR) or org. Zn or Cd salts (forming dithioethers, $SRCH_2CH_2SR$). *E.g.*, $N_2 + C_2H_2$ (1:2) is passed into $PhSH + Bu^+OH + KOH$ in an autoclave until the pressure rises to 15 atm., and the product is heated at 160° for 16 hr.; 91% of theory of CH_2CH_2SPh (I) is formed. Addition of $Zn(OAc)_2$ to the reaction mixture gives (I) (25%) and $(CH_2CH_2SPh)_2$, m.p. 170° (75%). Other examples include the prep. of *vinyl thiop-tolyl*, b.p. 98–100°/14 mm., β -*naphthyl*, b.p. 125–130°/14 mm., *2-benzthiazyl*, b.p. 135–140°/2–3 mm., *-ethyl*, b.p. 91°, *-benzyl*, b.p. 73°/3 mm., *-8-chloronaphthyl*, b.p. 154–155°/2–3 mm., *-dodecyl*, b.p. 129–130°/3 mm., and *-5-chloro-2-p-xylyl ether*, b.p. 110–112°/4–5 mm.; also *s-diethyl*, b.p. 90–95°/24 mm., and *-di-p-tolyl-thioethane*, b.p. 185–186°/3–4 mm. H. A. P.

Production of colloidal solutions of inorganic substances [e.g., silver salts] in polyhydric alcohols. C. H. VON HOESSLE, Assr. to CHEM. FABR. VON HEYDEN A.-G. (U.S.P. 1,955,211, 17.4.34. Appl., 30.8.30. Ger., 24.1.30. Renewed 7.8.33).—A colloidal solution of Ag in H_2O containing a protective colloid is mixed with $C_2H_4(OH)_2$ and the H_2O is removed by evaporation. Treatment of the resulting colloidal solution with I or Br converts the Ag into AgI or AgBr without coagulating the colloid. (Cf. U.S.P. 1,922,006; B., 1934, 492.) A. R. P.

Manufacture of diphenyl. J. E. MOOSE and W. N. PRITCHARD, Assrs. to SWANN RESEARCH, INC. (U.S.P. 1,968,154, 31.7.34. Appl., 22.4.30).—Increased yields from C_6H_6 are obtained by inhibiting C formation induced by metal surfaces of plant by coating these with, in order of decreasing effect, Se, CoS, Co, $K_2Cr_2(SO_4)_4$, $NiCl_2$, As, CuS, Si, Sb, $SbCl_3$, Sn, Sb_2S_5 , $MoS_{(1-4)}$, Mo, P_2S_5 , As_2S_5 , $SnS_{(1-4)}$, ZnS, FeS, $Na_2B_4O_7$, nichrome, Parkerised Fe, CdS, $AlCl_3$, Fe, Zn, Ag, VCl_3 , Fe pickled in HNO_3 , Cd, Cu, $MnCl_2$, Al, ZnO, $CuCl_2$. (Apparatus is claimed.) Thus, C_6H_6 can be maintained at decomp. temp. (800°) for much longer periods, leading to higher yields, with less loss by carbonisation. A. W. B.

Manufacture of hydroxydiphenylene compounds. I. G. FARBENIND. A.-G. (B.P. 427,816, 1.11.33. Ger., 1.11.32).—The corresponding halogeno-compound is heated under pressure with an aq. alkali or alkaline earth (and Cu or a Cu salt). *E.g.*, 3-bromodiphenylene oxide is heated with 16% NaOH at 250° to give the 3-OH-compound, m.p. 136°; the 3-Cl-compound gives similar results. *2-Hydroxy-diphenylene oxide*, m.p. 139–140°, and *-thianthrene*, m.p. 145°, and *3-hydroxydiphenylene sulphide*, m.p. 156°, and *sulphone*, m.p. 264°, are similarly prepared. H. A. P.

Removal of primary aromatic amines from aqueous solutions. W. L. SEMON, Assr. to B. F. GOODRICH Co. (U.S.P. 1,968,913, 7.8.34. Appl., 22.5.33. Cf. U.S.P. 1,942,838; B., 1934, 921).—Aromatic amines, *e.g.*, $p-NH_2C_6H_4NMe_2$, $p-C_6H_4(NH_2)_2$, $C_{10}H_7NH_2$, benzidine, are pptd. quantitatively from aq. solution, avoiding solvent extraction, by adding phenolic (polyhydric) substances, *e.g.*, PhOH, $C_6H_4(OH)_2$, $C_{10}H_7OH$, alizarin. The additive compound may be treated to

yield the amine, or may be used in some reactions instead of the free amine. A. W. B.

Manufacture of phthalimide. A. O. JAEGER and L. C. DANIELS, Assrs. to SELDEN RES. & ENG. CORP. (U.S.P. 1,968,253, 31.7.34. Appl., 17.11.30).—Extremely crude $o-C_6H_4(CO)_2O$ (I), *e.g.*, distillation tars, coke, etc., can be used; (I) is treated with 1–2 mols. of aq. NH_3 , H_2O removed, and phthalimide sublimed (250–300°, steam-heated condenser). Coloured sublimate are removed by a scrubber of Al_2O_3 gel. Use of $OH[CH_2]_2NH_2$, NH_2Me , and NH_2Ph instead of NH_3 gives, respectively, *N*- ω -hydroxyethyl-, *N*-methyl-, and *N*-phenyl-phthalimide. A. W. B.

Production of phenol. RÜTGERSWERKE A.-G., and L. KAHL (B.P. 427,145, 4.5.34. Ger., 10.5.33).—The yield of PhOH, from the hydrogenation of higher homologues, is improved, reducing hydrocarbon formation, by working under increased pressure, *e.g.*, 300 atm., rapid attainment of the reaction temp., *e.g.*, 550–650° (by mixing the homologues with preheated H_2 or CO and steam), a short reaction period, *e.g.*, ≥ 0.5 hr., and rapid cooling; apparatus is claimed. A. W. B.

Preparation of hexachlorophenol. E. C. BRITTON, L. F. MARTIN, F. N. ALQUIST, and R. L. HEINDEL, JUN., Assrs. to DOW CHEM. Co. (U.S.P. 1,969,686, 7.8.34. Appl., 12.4.32).—PhOH is exhaustively chlorinated at 60–100° (70–80°), in presence of a chlorination catalyst (I), *e.g.*, $SbCl_5$, I, S_2Cl_2 , in a solvent of b.p. $< 60^\circ$ such as saturated hydrocarbon oil fractions or liquid chloroparaffins, *e.g.*, $C_2H_4Cl_2$, thus avoiding solidification of the mixture at the Cl_5 -stage and over-chlorination, and facilitating recovery of (I). A. W. B.

Manufacture of thymol. W. J. HUND (U.S.P. 1,967,440, 24.7.34. Appl., 28.4.30).—California laurel oil is heated at $> 232^\circ$ (280°)/ > 1 atm. for about 1 hr., thus eliminating isolation and purification of umbellulone. A. W. B.

Manufacture of aromatic carboxylic acids. L. P. KYRIDES, Assr. to MONSANTO CHEM. Co. (U.S.P. 1,968,300, 31.7.34. Appl., 6.12.29).—Aromatic aldehydes (PhCHO), aralkyl chlorides or ethers are heated with dil. caustic alkali (48% NaOH) for 7–8 hr. (250–280°/300–500 lb. per sq. in.). Yields of 80–90% of theory (BzOH) are claimed. A. W. B.

Preparation of cyclic compounds. W. H. CAROTHERS and A. M. COLLINS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,862, 24.7.34. Appl., 2.11.31).— $\alpha\gamma$ -Dienes (β -negatively substituted, *e.g.*, halogen or Ph) are made to react, in presence of polymerisation inhibitors, *e.g.*, antioxidants, where necessary, with compounds containing active C:C linkings, *e.g.*, $\alpha\beta$ -unsaturated carboxylic acids, esters, anhydrides, aldehydes, and ketones, on quinones. The products may be dehydrogenated. β -Chlorobutadiene (I) and benzoquinone (II) \rightarrow 6-chloro-4a:5:8:8a-tetrahydro-1:4-naphthoquinone (III), m.p. 101–104°, isomeride \rightarrow 6-chloro-1:4-dihydroxy-5:8-dihydronaphthalene (IV), m.p. 197–198°, oxidised \rightarrow 6-chloro-5:8-dihydro-1:4-naphthoquinone (V), m.p. 95–96°, and 6-chloro-1:4-naphthoquinone (VI), m.p. 97–98°; (III) with $Cl_2 \rightarrow C_{10}H_8O_2Cl_2$, m.p. 187°, and $C_{10}H_7O_2Cl_3$, m.p. 155–157°;

(I) and Me vinyl ketone \rightarrow 4(or 5)-chloro-1:2:3:6-tetrahydroacetophenone, b.p. $80^{\circ}/2$ mm. (semicarbazone, m.p. $183\text{--}184^{\circ}$); (I) with acraldehyde \rightarrow 4(or 5)-chloro-1:2:3:6-tetrahydrobenzaldehyde, b.p. $70^{\circ}/2$ mm., trimeride, m.p. $197\text{--}200^{\circ}$ (semicarbazone, m.p. $155\text{--}157^{\circ}$); (I) with Et maleate \rightarrow Et₂-4-chloro-1:2:3:6-tetrahydrophthalate (VII), b.p. $165^{\circ}/4$ mm. \rightarrow corresponding di-acid (VIII), m.p. $128\text{--}129^{\circ}$; (I) with Et fumarate \rightarrow stereoisomeride of (VII), b.p. $146\text{--}148^{\circ}/4$ mm. [(I) with maleic acid or anhydride (IX) \rightarrow stereoisomeride of (VIII), m.p. $171\text{--}172^{\circ}$]; β -bromobutadiene (X) with (IX) \rightarrow 4-bromo-1:2:3:6-tetrahydrophthalic acid, m.p. $186.5\text{--}187^{\circ}$. Esters of these acids, e.g., Me-amyl, are good solvents. (I) and 1:4-naphthaquinone (XI) \rightarrow 2-chloro-, m.p. 76° , (X) and (XI) \rightarrow 2-bromo-, m.p. 138° , β -phenylbutadiene and (XI) \rightarrow 2-phenyl-, m.p. $146\text{--}147^{\circ}$, -1:4:4a:9a-tetrahydroanthraquinones; 2-chloro-3:4-tetramethylenebutadiene with (XI) \rightarrow 2-chloro-3:4-tetramethylene-, m.p. $191\text{--}192^{\circ}$, 2-chloro-3-methylbutadiene with (XI) \rightarrow 2-chloro-3-methyl-, m.p. $155\text{--}156^{\circ}$, -1:4:4a:9a-tetrahydroanthraquinones; β -chloro- α -methyl-, - α -ethyl-, - α -butyl-, and - α -heptyl-butadienes with (XI) give, respectively, after oxidation, 2-chloro-1-methyl-, m.p. 181° , -1-ethyl-, m.p. $151\text{--}152^{\circ}$, -1-butyl-, m.p. $129\text{--}130^{\circ}$, and -1-heptyl-, m.p. $112.5\text{--}113.5^{\circ}$, -anthraquinones; γ -chloro- $\alpha\beta$ -dimethylbutadiene and (XI) \rightarrow 3-chloro-1:2-dimethyl-1:4:4a:9a-tetrahydroanthraquinone, m.p. 107° , oxidised \rightarrow 3-chloro-1:2-dimethylantraquinone, m.p. 171.5° ; (I) with (II) or (III) \rightarrow 2:6-dichloro- (XII), m.p. $220\text{--}222^{\circ}$, and 2:7-dichloro- (XIII), m.p. $145\text{--}148^{\circ}$, 1:4:4a:5:8:8a:9a:10a-octahydroanthraquinones; (XII) and (XIII), with Cl₂ \rightarrow a trichloroanthraquinone, m.p. 222° ; (XII) and (XIII) oxidised \rightarrow 2:6-dichloro-, m.p. $284\text{--}286^{\circ}$, and 2:7-dichloro-, m.p. 223° , -anthraquinones; (I) with (V) \rightarrow 2:6-dichloro- (XIV), m.p. $254\text{--}256^{\circ}$, and 2:7-dichloro- (XV), m.p. $246\text{--}247^{\circ}$, -1:4:4a:5:8:8a:9a-hexahydroanthraquinones; (I) with (VI) \rightarrow 2:6-dichloro- (XVI), m.p. $194\text{--}196^{\circ}$, and 2:7-dichloro- (XVII), m.p. $174\text{--}175^{\circ}$, -1:4:4a:9a-tetrahydroanthraquinones; (XVI) isomerises \rightarrow 2:6-dichloro-9:10-dihydroxy-1:4-dihydroanthracene, m.p. $264\text{--}267^{\circ}$, oxidises to a blue quinhydrone, m.p. $273\text{--}274^{\circ}$ \rightarrow 2:6-dichloro-1:4-dihydroanthraquinone, m.p. 293° ; similarly (XVII) \rightarrow 2:7-dichloro-9:10-dihydroxy-1:4-dihydroanthracene, m.p. $245\text{--}250^{\circ}$, \rightarrow a blue quinhydrone, m.p. 230° , \rightarrow 2:7-dichloro-1:4-dihydroanthraquinone, m.p. 196° ; (XIV) and Ac₂O \rightarrow 2:6-dichloro-9:10-dihydroxy-1:4:5:8-tetrahydroanthracene diacetate, m.p. $290\text{--}293^{\circ}$; (XVI) with Ac₂O \rightarrow 2:6-dichloro-9:10-dihydroxy-1:4-dihydroanthracene diacetate, m.p. $264\text{--}267^{\circ}$. A. W. B.

Sulphonation of β -naphthylamine. J. M. TINKER and V. A. HANSEN, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,969,189, 7.8.34. Appl., 4.3.32).—2:1-NH₂·C₁₀H₆·SO₃H is obtained in 90% yield by passing SO₃ (1 mol.), free from H₂SO₄, into β -C₁₀H₇·NH₂, in an inert solvent (C₂H₅Cl₄), at $\geq 90^{\circ}$ and completing sulphonation at $\geq 100^{\circ}$. A. W. B.

[Manufacture of] normal ferrous salt of 2-nitronaphthalene-4:8-disulphonic acid. A. SIGWART, Assr. to GEN. ANILINE WORKS, INC. (U.S.P. 1,968,964,

7.8.34. Appl., 4.4.32).—2:4:8-NO₂·C₁₀H₅(SO₃H)₂ is freed from isomerides formed in the nitration of C₁₀H₆(SO₃H)₂ by pptn. with H₂O-sol. Fe^{II} salts, e.g., FeCl₂, FeSO₄, adding them to the nitration mixture, diluted to about 20% H₂SO₄ content, at $40\text{--}50^{\circ}$. A. W. B.

Manufacture of dibenzanthrone derivatives. E. J. HOWELL, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,967,617, 24.7.34. Appl., 27.12.32).—Yield and purity of dihydroxydibenzanthrone from benzanthrone (I) are improved by use of very mild oxidation conditions in the first stage [80% H₂SO₄ + MnO₂, or conc. H₂SO₄ + Mn₂(SO₄)₃ at $0\text{--}5^{\circ}$], leaving 30–40% of unchanged (I), followed by fusion and oxidation in known manner. A. W. B.

Manufacture of furfuryl xanthate. C. H. KELLER, Assr. to MINERALS SEPARATION NORTH AMER. CORP. (U.S.P. 1,969,269, 7.8.34. Appl., 12.7.30).—Furfuryl alcohol is treated with CS₂ in presence of aq. caustic alkali, e.g., KOH, all in practically equimol. proportions, and a neutral liquid, e.g., Et₂O, at $5\text{--}10^{\circ}$. The product is a froth-flotation agent. A. W. B.

Manufacture of nitrogenous condensation products. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 427,733, 19.10.33).—*meso*-Halogenoacridines (I) are condensed with aminoanthraquinones or their derivatives (II) (in org. solvents, e.g., PhNO₂ or C₆H₅Cl₃, in presence, if desired, of acid-binding agents and/or Cu compounds). In place of (I) the corresponding acridones and chlorinating agents (SOCl₂, PCl₅, POCl₃) may be used. Examples of (I) are: 10-chloro-, 7:10-dichloro- (III), or 10-chloro-7-methyl-2:3-benzacridine-1:4-quinone (IV), and of (II) 1- or 2-amino-, 1:3-, 1:4-, or 1:5-diamino-, 1-amino-4- or -5-benzamido-, and 1-amino-4-methoxy-anthraquinone, and aminodibenzanthrone. (III) is prepared by condensing 1:4-naphthaquinone with 2:4:1-NH₂·C₆H₃Cl·CO₂H, cyclisation with conc. H₂SO₄, and chlorination of the product (PCl₅); (IV) is similarly prepared from 3:1:4-NH₂·C₆H₃Me·CO₂H. H. A. P.

Preparation of dibenzthiazyl disulphide. SILESIA VER. CHEM. FABR. (B.P. 427,847, 1.6.34. Ger., 18.7.33).—The process of U.S.P. 1,880,421 (B., 1933, 907) is improved by oxidising 2-mercaptobenzthiazole with dil. HNO₃ (7–20%) at room temp. and, if desired, under slightly increased pressure. Only theoretical quantities of HNO₃, viz., $\frac{1}{2}$ mol., are taken up, but excess may be used and carried forward; material of f.p. $173\text{--}177^{\circ}$ is obtained. A. W. B.

Recovery of olefines from gases.—See II. Dispersions for textiles.—See VI. Glucosides.—See XVII. BuOH by fermentation.—See XVIII.

IV.—DYESTUFFS.

See A., June, 713, Photolysis of diazo compounds. 743, Prep. of disazo dyes from *m*-C₆H₄(NH₂)₂. 758, [Dyes from] naphthalomethylimide derivatives. 763, Dyes from benzanthrone derivatives.

PATENT.

Manufacture of water-soluble diazoimino-compounds. I. G. FARBERIND. A.-G. (B.P. 427,803,

31.10.33. Ger., 15.2.33. Addn. to B.P. 320,324 and 407,840; B., 1930, 233; 1934, 445).—Diazonium salts from H_2O -insol. amines are condensed with heterocyclic *sec.*-amines possessing no free coupling position and containing $\leq ISO_3H$ or CO_2H , in presence of an acid-binding agent (Na_2CO_3). Products of B.P. 407,840 are excluded. Examples are the *diazoimino-compounds*: 1:2:4:5- $NH_2 \cdot C_6H_2Cl(OMe) \cdot NHBz$ + 2:2:4:6-tetramethyl-1:2:3:4-tetrahydroquinoline, *m*- $NH_2 \cdot C_6H_4Cl$ + 2-methyl-2:3-dihydroindolesulphonic acid, 1:5:2- $NH_2 \cdot C_6H_3Cl \cdot OMe$ + carbazole-2-sulphonic acid, and 2:1:4- $NH_2 \cdot C_6H_3MeCl$ + hexahydrocarbazolesulphonic acid. H. A. P.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Acid groups of cellular and fibrous substances. II. M. LÜDTKE (Tech. u. Chem. Papier Zellstoff-Fabr., 1934, 31, 37—42; Chem. Zentr., 1934, ii, 3868; cf. A., 1934, 464).—After treatment with 0.5% HCl to remove basic constituents, cellular substances (*e.g.*, cotton or flax) show an acid character due to CO_2H groups. This may be determined by treatment with KIO_3 —KI and titration of the liberated I, or by treatment with $Ca(OAc)_2$ solution or EtOH—KOAc and titration of the AcOH formed. Vals. are tabulated. H. J. E.

Study of textile fibres with the Reichert fluorescence microscope. E. GÖTHEL (Melliands Textilber., 1934, 15, 409—412; Chem. Zentr., 1934, ii, 3698).—Observed fluorescence phenomena are tabulated. H. J. E.

Alteration of cellulose by alkaline solutions. D. KRÜGER and H. GRUNSKY (Melliands Textilber., 1934, 15, 405—408; Chem. Zentr., 1934, ii, 3500).—Previous work on the diminution of particle size (*P*) of cellulose by treatment with alkali is discussed and criticised. It is shown experimentally that no conclusions as to *P* can be drawn from η and diffusibility measurements. H. N. R.

Chemical and physical nature of nitrocellulose. Separation of nitrocelluloses. A. BECK, L. CLEMENT, and C. RIVIÈRE (Monit. Prod. chim., 1934, 16, No. 184, 13—14; No. 185, 3—7; Chem. Zentr., 1934, ii, 3501).—Using a 5% instead of a 12% $COMe_2$ solution 12 fractions were obtained; study of these showed that nitrocellulose is chemically homogeneous but physically heterogeneous. (Cf. B., 1931, 197.) H. N. R.

Factors which govern the solubilities of cellulose derivatives. BODENBENDER (Farbe u. Lack, 1935, 255—256).—Highfield's theory (B., 1926, 188) has been extended by Mienes to the cellulose ethers, the solubility of which in aromatic hydrocarbons is attributed to their being less polar than cellulose esters. With increase in the degree of etherification larger proportions of EtOH are required. Ethylcellulose has a polarity intermediate between the vals. for cellulose esters and benzylcellulose and hence is sol. in polar and non-polar solvents. S. M. H.

Suggestions for the manufacture of cuprammonium rayon. E. SCHURZ (Chem.-Ztg., 1935, 59, 437).—Nitrating cotton is a suitable raw material which can be directly dissolved without previous kier-boiling,

bleaching, and milling. Wood pulp can be dissolved provided it is not dried after cooking, or is mixed with $Cu(OH)_2$ before drying. A. G.

Retarding effect of metallic salts on coagulation of viscose. V. DUCHESNOY (Rev. univ. Soies, 1934, 9, 641—645; Chem. Zentr., 1934, ii, 3696—3697).—A thread containing cellulose xanthate (*C*) reacts with I, setting free HI. *C* is first hydrolysed to cellulose and Na_2CS_3 , which reacts with I to form NaI, HI, CO_2 , CS_2 , and S. An analytical method for *C*, based on this reaction, is described. The retarding effect of sulphates of Na, NH_4 , Mg, and Zn has been studied; $ZnSO_4$ is 8—10 times more active than are the others. An enhanced effect is obtained by mixing the sulphates. H. J. E.

Action of alkalis on viscose silk. L. P. MICHEL (Rev. univ. Soies, 1934, 9, 651—657; Chem. Zentr., 1934, ii, 3697).—Viscose silk treated with linseed oil loses 1—5 wt.-%, increases its cross-section by up to 50%, and shows a 15% decrease in strength on subsequent treatment with KOH. H. J. E.

Replacement of cotton linters by wood-cellulose in acetate silk manufacture. K. ROOS (Kunstseide, 1934, 16, 346—352; Chem. Zentr., 1934, ii, 4039).—The ease of acetylation of celluloses of different origin depends on the ash content and surface structure, rather than on α -cellulose. J. S. A.

Composition and properties of the mucilage (kittstoff) obtained as a by-product in the manufacture of wood pulp. A. LOTTERMOSER and T. WILHELM (Kolloid-Beih., 1935, 41, 393—416).—The mucilage (I) consists of a sol of very small fibres, containing more resin and oil (sol. in 1:1 EtOH— C_6H_6) than wood pulp, but with approx. the same lignin content. The dispersion medium has been analysed. The electrokinetic potential (ζ) of (I) has been determined microscopically in presence of salts, particles of (I) carrying a negative charge. The influence of cations on ζ increases with valency. NaOH imparts a large negative charge to the particles. The coagulation of (I), cellulose sol (II), and lignin sol (III) on addition of salts is more pronounced with increasing charge of the cation, the anion being almost without influence. The coagulating effect of salts is in the order (II) > (I) > (III). HCl gives the same result as a bivalent cation, since the H ions are readily adsorbed on account of their small size. With increasing $[ThCl_4]$, dil. (I), (II), and (III) pass through a region in which the influence of the coagulating ion decreases and then increases. The adsorption of $AlCl_3$ on (I) is small, and at 0.02—0.1N is negative. The application of these results to the wood-pulp industry is discussed; on addition of electrolytes the swelling of fibres can be increased, and the p_H of the solution is also important. R. S. B.

Chemical residues in paper. J. STRACHAN (Paper Maker, 1935, 89, 65—66 rs).—The origin and effect of a no. of chemical impurities in paper are discussed. These include metallic oxides, S, Cl, and acid. Such residues are much more reactive on the surface of cellulose fibres than in solutions of similar concn. H. A. H.

Stiffness testing of paper. C. A. MINOR and J. E. MINOR (Paper Ind., Apr., 1935, 35—37).—Stiffness (*S*) is not an indication of fibre quality as such, except in so

far as different kinds of fibres may be submitted to different kinds of treatment, such as beating and sizing. For heavy (tag and index) papers, *S* is much more sensitive to beating degree than is tearing-resistance (*T*), but less sensitive to fibre weakness and to reduction in fibre length. For thin (bond and ledger) papers which are beaten to max. strength, *S* is not more sensitive than *T*, and differentiates less clearly than *T* between rag and wood papers. *S* is not sensitive to changes in R.H. Good correlation can be obtained between the Gurley and Suvant instruments for measuring *S*.

H. A. H.

Errata.—After "refined kraft" on page 489, col. 1, line 23, add "among the softwood fibres," and for "F" on line 24 read "C."

See also A., June, 697, Sorption of basic dyes on Cellophane. 750, Prep. of vanillin from sawdust and sulphite liquor.

PATENTS.

Manufacture of artificial textile materials. BRIT. CELANESE, LTD. (B.P. 425,044, 4.9.33. U.S., 3.9.32).—Org. cellulose derivatives are conditioned, prior to fabric formation, by treatment with cyclic condensation products of aldehydes, e.g., CH_2O , MeCHO , PhCHO , and (a) (α)-hydroxymonocarboxylic acids, e.g., $\text{OH}\cdot\text{CMe}_2\cdot\text{CO}_2\text{H}$, or (b) alcohols (partial ethers of dihydric alcohols), e.g., $\text{OH}\cdot[\text{CH}_2]_2\cdot\text{OMe}$. These agents can be incorporated in conditioning fluids, lubricating oils, and hygroscopic substances, e.g., polyhydric alcohols. Fibres are thus rendered more amenable to knitting, weaving, and mechanical processes.

A. W. B.

Manufacture of acetyl ester compounds [cellulose acetate]. K. SUGANUMA and K. I. GOTO (U.S.P. 1,968,179, 31.7.34. Appl., 5.10.31. Jap., 15.11.29).—Aromatic hydroxycarboxylic acids or cellulose are acetylated (30–40°) in 10–15 hr. in a bath of NaOAc , AcOH , or C_6H_6 and SO_2Cl_2 .

A. W. B.

Compositions and other products comprising cellulose derivatives. BRIT. CELANESE, LTD. (B.P. 424,838, 23.8.33. U.S., 23.8.32).—The use of formals of (α)-hydroxy-carboxylic acids ($\geq \text{C}_4$) obtained by interaction of CH_2O , or equiv., with, e.g., $\text{OH}\cdot\text{CMe}_2\cdot\text{CO}_2\text{H}$ to give methylidene- α -hydroxyisobutyric acid, b.p. 148–149°, as solvents or softeners for derivatives (acetate) of cellulose is claimed.

A. W. B.

Centrifuge pots or buckets such as are used in the manufacture of rayon. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 427,770, 8.9.34. U.S., 9.9.33).—Acid- and stress-resisting buckets are formed of metal perforated to form a key, coated with hard rubber, and again coated with textile layers united by artificial resin. Drainage holes are pierced through at the key perforations.

B. M. V.

Utilising purified Musa fibre cellulose. E. C. WORDEN, 1st, Assr. to HANSON & ORTH (U.S.P. 1,964,017, 26.6.34. Appl., 29.11.30).—Cellulose prepared from *Musa* fibre, and containing $\leq 93\%$ of α -cellulose, is dried at $< 100^\circ$, allowed to cool in airtight containers, and nitrated with a mixture of 23–25% of HNO_3 , 54–58% of H_2SO_4 , and 17–23% of H_2O at about 45° for 30–40 min. It is then rapidly washed with a

large vol. of cold H_2O until faintly acid, boiled with H_2O for 2–4 hr., neutralised with dil. aq. Na_2CO_3 , and dried.

D. A. C.

Pulping of fibrous and cellular materials. DE LA ROZA CORP. (B.P. 428,120, 21.9.34. Appl., 21.9.33).—A continuous digester is described, which consists of an outer stationary horizontal cylindrical vessel (*V*), and an inner rotating perforated *V*. The raw material, which has been previously soaked in the cooking liquor, is continuously fed by means of a plunger pump into the perforated *V* under pressure through a tapered inlet passage (*P*) which is narrower than *V*. Thus since the *d* of the stock in *P* is considerably $>$ that in *V*, it acts as a valve. Automatic control is maintained of the rate of circulation of cooking liquor (*L*) between the outer *V* and a heat exchanger, the temp. of *L*, and the rate of charging and discharging the pulp.

D. A. C.

Production of paper pulp. P. A. PAULSON (U.S.P. 1,969,421, 7.8.34. Appl., 5.11.32).—Three sulphite digesters (*D*) forming a battery are connected together by a common gas-relief header (*H*), the pressure in which is automatically controlled. The cooking cycle is so arranged that any two *D* are under full pressure while the third, which is being charged, is rapidly brought up to the max. pressure by relieving one of the other two *D* through *H*. The required temp. in the newly-filled *D* is reached by admitting steam through a large const. orifice and is automatically maintained by continuously admitting steam throughout the cook through a smaller const. orifice.

D. A. C.

Bleaching wood pulps. D. B. DAVIES (U.S.P. 1,968,994, 7.8.34. Appl., 8.4.31).—The pulp (*P*) is bleached in a single, vertical, cylindrical cell (*C*) having a base which is either circular or shaped as a steep cone. *P* is circulated upwards through the centre of *C* by an archimedean screw (*A*), and is prevented from forming a conical pile as it reaches the top of the charge by rotating levelling arms (*L*), which distribute it radially. Bleach liquor enters through perforations in *L*. Where the base of *C* is circular, a rotating plough is provided to move *P* towards the lower end of *A*.

D. A. C.

Manufacture of transparent [waterproof wrapping] sheets or coatings. F. H. CLICKNER, Assr. to KRAFT-PHENIX CHEESE CORP. (U.S.P. 1,968,991, 7.8.34. Appl., 30.1.33).—Various salts are removed from commercial casein by filtering a 15% aq. solution (p_H 7.2) under pressure at 70° ; glycerol or other plasticiser is incorporated with the solution and the prepared sheets are treated with CH_2O etc. Edible dyes may be incorporated.

S. M.

Manufacture of metallised sheets [of cellulose material]. G. H. ROY (B.P. 426,292, 26.3.34).—Sheets for wrapping, of Cellophane type, are painted on one or both sides with a suspension of a metal powder in a cellulose lacquer, and then coated with a film of H_2O -resistant material.

A. R. P.

Impregnation of fibrous material [e.g., paper insulators for electric cables]. STANDARD TELEPHONES & CABLES, LTD., and R. C. MILDNER (B.P. 424,586, 24.8.33).—Claim is made for a combination of

vac. chambers, the inner (I) being evacuated to a lower pressure than the outer, and means for introducing the impregnating material into (I). A. R. P.

Production of mica-covered papers. H. R. RUGGLES-BRICE (B.P. 426,191, 21.11.34).—The paper is coated with a thin layer of adhesive, *e.g.*, paper size, and sprayed automatically with mica flakes before the size dries. A. R. P.

Treatment of paper and cloth. J. HALDEN & Co., LTD., and J. HOLDEN (B.P. 425,215, 6.6.33).—Translucent fabrics, *e.g.*, tracing papers, are improved by application of a wetting agent, *e.g.*, C_{16} — C_{18} saturated, unsaturated, or OH-unsaturated alcohols in non-aq. solution, higher alkyl sulphates, alkyl naphthalene-sulphonic acids, higher alkyl ethers of glycol or glycerol (with one free OH group), and hydroxyalkyl aromatic compounds, and a colloid, *e.g.*, starch, before, during, or after treatment with medium imparting translucency. Improved inking properties are claimed. A. W. B.

[Spraying apparatus for] production of multi-shade mottled paper. O. H. HEDSTROM (B.P. 426,303, 27.8.34).

Abrasive sheet.—See VIII. Nitrocellulose cement.
—See XIII. Films from starch.—See XVII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Kier-boiling efficiency. F. SCHOLEFIELD and D. WARD (J. Soc. Dyers and Col., 1935, 51, 172—178).—Comparison is made between the vals. of Lissapol-A (I.C.I.) (I) and resin soap (II) as assistants in the kier-boiling (with NaOH) of cotton, and also between the efficiencies of one prolonged boil (7.5 hr.) and a consecutive series of 3 short-period (2.5 hr. each) boils, using a kier (45 gals.) and American cotton plain fabric previously singed and desized with Polyzyme-N. The kier-boiled fabrics were examined with regard to their whiteness (*B*) (before and after subsequent bleaching), $CHCl_3$ extract (*E*) (cf. B., 1924, 372), wettability (*W*), Cu no. (*C*), and tensile strength (*T*). Kiering with an optimum amount (0.2% on vol. of liquor) of (I) gives a fabric which has much superior *B* (especially before bleaching), approx. 30% smaller *E*, slightly improved *W*, and normal *C* and *T*. The presence of 0.2% of (II) in the kier liquor produces a fabric slightly less white [= to that produced with 0.05% of (I)], but having approx. 50 and 25% less $CHCl_3$ -extractable matter before and after bleaching, respectively, than when (I) is used. (II) removes natural fats and waxes from cotton efficiently, but it is difficult to remove it completely from the fabric by washing. With the consecutive short-period boils purification of the fabric proceeds steadily and is greater than that obtained with the prolonged boil. A. J. H.

[Behaviour of] stainless steel in the textile industry. J. E. GOODAVAGE (Amer. Dyestuff Rep., 1935, 24, 250—255).—Comparison is made of the behaviour of monel metal (I) and Fe—Cr, Fe—Cr—Ni, and Fe—Cr—Ni—Mo steels (II) in various textile-processing liquors, including liquors used for dyeing wool with acid and chrome-mordant dyes (III), aq. AcOH (p_H 3.95), HCO_2H (2.85), H_2SO_4 (2.02), a diazotising liquor

($HCl + NaNO_2$) (IV) as used for after-treating fabrics dyed with direct dyes, a bleach liquor ($H_2O_2 + Na$ silicate), a scouring liquor (2% NaOH + $H_2O_2 + Na$ silicate), and typical direct, S (V), and vat dye (VI) liquors; detailed results are tabulated. (I), but not (II), is corroded and discoloured by (IV), and (II) is much better than (I) for the construction of wool-dyeing machines since it exerted no influence on the shades produced with the 60 dyes (III) tested. (II) is satisfactory when used for machines in which bleaching is effected intermittently with aq. NaOCl (VII) (d 1.005—1.015), but it is attacked during prolonged storage of (VII). (I) is stained by (VI) and (VII), but (II) is quite resistant. (II) has a higher tensile strength and harder surface than (I). A. J. H.

Mordanting vegetable fibres and artificial silk. ANON. (Boll. Reparto fibre tess. veg., 1934, 29, 483—484; Chem. Zentr., 1934, ii, 3843—3844).—The condensation product of o - $C_6H_4MeNH_2$ with CH_2O in mol. proportions in the warm, and in presence of HCl, is sol. in dil. AcOH. This substance will ppt. many acid dyes, forming insol. lakes, but does not affect basic dyes. Applications to the dyeing of viscose and cotton are described.

H. J. E.

[Aluminium chloride] wool-carbonisation process and its effect on the dyeing properties of wool. B. A. RYBERG (Amer. Dyestuff Rep., 1935, 24, 150—162, 248—249, 255; cf. B., 1934, 755).—Carbonisation (*C*) of vegetable fibrous impurities in wool is effected by impregnation with 4—10% aq. $AlCl_3$ (I) containing added HCl to give p_H 1.4—1.8 (Tropæolin OO indicator) followed by drying at 93° and baking at 115°. After *C*, wool has increased affinity for acid dyes (*A*) and decreased for basic dyes; the affinities are $\propto [HCl]$ in the carbonising liquor, this effect being opposite to that produced by *C* with H_2SO_4 (cf. B., 1934, 667) or oxidation with H_2O_2 . These changes in the dye affinity of wool are almost independent of $[I]$, whereas $[H_2SO_4]$ has a large influence. Wool baked with (I) or HCl alone has an increased affinity for *A*. About 0.2% of Al remains in the wool after *C*, and mechanical dusting and removal of this by treatment with HCl gives the wool an increased affinity for *A* > that produced by *C*. Drying of wool at a low temp. (*e.g.*, 71°) before *C* produces a greater increase of affinity for *A* than does drying at a high temp. (*e.g.*, 93°), whereas the reverse is true for *C* with H_2SO_4 . The R.H. in the dryer has little effect on the increase of dye affinity, whereas a low R.H. is required in *C* with H_2SO_4 . Variations in time and temp. in *C* with (I) have little effect on the dyeing properties of the wool. Wool is less likely to become uneven-dyeing in *C* with (I) than with H_2SO_4 , but the former process is 6—8 times the more costly in chemicals. A. J. H.

Foulard and reserve dyeing with indigosol-O. L. CABERTI (Boll. Staz. Sperim. Ind. Carta Fibre Tess., 1935, 30, 228—231).—For obtaining medium and medium-dark colours, indigosol-O compares well with indigo, because, in a single stage to the foulard, good penetrating colours highly resistant to scouring are obtained even with close, heavy fabrics. Various procedures are described (cf. B., 1935, 302). T. H. P.

Discoveries relating to the theory and practice of wool dyeing. L. P. RENDELL and H. A. THOMAS (J. Soc. Dyers and Col., 1935, 51, 157—172).—Excellent penetration, level dyeing, and rapid exhaustion are obtained in dyeing thick wool felt with acid, chrome, Neolan (Cr-containing dyes), vat, direct, and basic dyes in a liquor at $< 100^\circ$ (usually 80°) maintained turbulent by bubbling in air or by reducing the pressure so that the liquor boils freely; the results are generally much superior to those obtained in dyeing at 100° under the usual conditions, even with poor levelling dyes such as the fast-to-milling dyes (*e.g.*, Coomassie Milling Scarlet 5BS). Turbulent dyeing (I) as obtained with air gives better results than when produced by low-pressure boiling. (I) at 80° yields shades 10% $<$ those produced under ordinary conditions at 100° ; 20% weaker dyeings are produced at 60° except with Azo Geranine 2GS and Naphthalene Orange GS, which are not weaker. (I) allows Neolan dyes to be applied satisfactorily at 80° with 3% instead of the usual 7% H_2SO_4 . Turbulency decreases the size of the dye particles and promotes the production of brighter and purer shades with Coomassie Navy Blue 2RNS, and the Azo Floxine or Rhodine type of dye. (I) leaves the wool in better condition than does dyeing at 100° under ordinary conditions. Explanations are offered.

A. J. H.

Determination of the value of products to aid mercerisation. S. REPLAT (Boll. Staz. Sperim. Ind. Carta Fibre Tess., 1935, 30, 231—233).—The val. of a wetting agent depends on (1) its stability in NaOH solution and (2) its action, which latter may be measured either by a modified Landolt apparatus or by the Schopper apparatus (described).

T. H. P.

Dressing of silk and artificial silk with aqueous emulsions. G. BARONI (Boll. Uff. R. Staz. Sperim. Seta, 1934, 4, 28—32; Chem. Zentr., 1934, ii, 3865).—A discussion of the treatment of various types of silk.

H. J. E.

Silks weighted with tanning materials. E. WULFF (Z. ges. Textilind., 1934, 37, 527; Chem. Zentr., 1934, ii, 3867).—The mechanical strength of silk is not impaired by treatment with tanning materials, but Fe compounds produce a black colour. Production of brown flecks by alkali is hindered by acid treatment.

H. J. E.

Fire-resistant doped fabric for aircraft. G. M. KLINE (Ind. Eng. Chem., 1935, 27, 556—561).—Doped fabrics were tested for wt., tautness, and inflammability, a test of horizontal rate of burning being used. For cellulose nitrate (I) the rate is 5 times that of cellulose acetate. Chlorinated resins which are of low inflammability give poor tautness. The solvent used is without importance. Mixtures of resins with (I) were not satisfactory. Cloth fireproofed with an addition of a borax- H_3BO_3 mixture before doping shows some reduction in burning rate in all cases, and with acetate dope flame spread does not occur. The wt. increase is $< 10\%$. Any further use of nitrate dope is deprecated.

C. I.

Determining sulphonic acids in textile agents.—See III. Action of alkalis on viscose silk.—See V.

See also A., June, 697, Sorption of basic dyes on Cellophane.

PATENTS.

Apparatus for fluid treatment of textile fibres, threads, and fabrics. T. W. HOLT, A. S. KILPATRICK, and J. F. W. STUART (B.P. 427,908, 27.12.33).—After passing through a preliminary wetting tank the material is deposited by a plaiting device on paddles projecting from the end drum of an upper conveyor (I) and thence deposited on a lower conveyor (II); it then continues between the parallel approx. horizontal runs of (I) and (II) in the form of bundles or heaps, (II) being entirely and (I) partly submerged in the treating liquid.

B. M. V.

Treatment [dyeing] of artificial filaments, threads, ribbons, and like materials. BRIT. CELANESE, LTD. (B.P. 425,131, 13.9.33. U.S., 13.9.32).—Dyeing (with H_2O -insol. dyes) of artificial fibres (cellulose acetate) is improved by the presence of condensation products of aldehydes, *e.g.*, CH_2O or PhCHO , with (a) hydroxycarboxylic acids, *e.g.*, $\text{OH}\cdot\text{CMe}_2\cdot\text{CO}_2\text{H}$, or (b) aliphatic partial ethers ($> 1\text{ OH}$) of polyhydric alcohols, *e.g.*, $\text{OH}\cdot\text{C}_2\text{H}_4\cdot\text{OEt}$.

A. W. B.

Manufacture of coloured artificial filaments, threads, bands, and the like. COURTAULDS, LTD., and S. ROBERTSON (B.P. 427,134, 8.2.34).—The processes of B.P. 181,902 and 290,693 (B., 1922, 627 A; 1928, 565), comprising addition of leuco-vat colouring matter (I) to viscose before spinning, are improved, reducing the tendency of (I) to crystallise out, by addition of glycol ethers, *e.g.*, them *ono*-Me, -Et, or -Bu ether of glycol or diethylene glycol, to the vat dye before or after conversion into the leuco-form.

A. W. B.

Colouring of water-insoluble plastic masses. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 427,194, 13.11.33).—Sparingly H_2O -sol. or insol. dyes, suitable for dyeing cellulose esters in aq. media, are used for colouring wholly or partly H_2O -sol. polymerisation products (I) of unsaturated compounds, *e.g.*, vinyl chloride, vinyl esters or ethers, acrylic nitrile or esters, or conversion products of (I) produced by, *e.g.*, chlorination or condensation of polymerised vinyl alcohols with aldehydes, or mixed polymerides from polymerisable aliphatic (II) and aromatic compounds, (II) being in excess. (I) are introduced into the dye bath (containing a dispersing agent, *e.g.*, Turkey-red oil, alkylated naphthalenesulphonic acids, polyethylene oxide, taurides of high fatty acids, fatty alcohol sulphonates, molasses, or sulphite-cellulose lye) at $<$ their softening point, *e.g.*, at 50 — 60° .

A. W. B.

Textile printing process. IMPERIAL CHEM. INDUSTRIES, LTD., R. W. HARDCRE, and A. WORMALD (B.P. 427,900, 2.11.33).—In printing vat dye (I) and Rapid Fast and/or Rapidogen dye (II) patterns side by side on cotton or other cellulosic fabric, (I) is applied in a paste containing FeSO_4 and SnCl_2 [instead of a $\text{CH}_2\text{O}\cdot\text{Na}_2\text{S}_2\text{O}_4$ compound which adversely affects development of (II)]. The fabric is afterwards steamed in presence of AcOH at 100° for 2—4 min. to develop (II), followed by overprinting with aq. NaOH and steaming to fix (I).

A. J. H.

[Textile-printing [assistants]. J. E. COLE, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,569, 24.7.34. Appl., 25.1.33).—Formates, or compounds capable of yielding them (HCO_2Na , $\text{HCO}\cdot\text{NH}_2$), are added ($> 20\%$) to dye pastes (indigoid or thioindigoid) or to the printing gum. Stronger and brighter prints are claimed. A. W. B.

Printing with dyestuffs. DURAND & HUGUENIN A.-G. (B.P. 427,058, 17.2.34. Ger., 27.2.33).—The known beneficial effects of urea on H_2O -sol. dyes in printing are enhanced when it is used in conjunction with a phenol, *e.g.*, PhOH or cresol, and an alcohol of b.p. $> 100^\circ$, *e.g.*, glycol, furfuryl and amyl alcohols. A. W. B.

Treatment of vegetable, animal, and artificial fibrous materials. H. HUNSDIECKER and E. VOGT (B.P. 424,717, 14.12.33. Ger., 14.12.32).—Textiles are treated, *e.g.*, wetted or cleansed, with salt-like reaction products of alkyl or aryl halides and $(\text{CH}_2)_6\text{N}_4$, the anions being converted, if desired, into any anion. Halides used are those of, *e.g.*, $\text{C}_{10}\text{H}_{21}\cdot\text{O}\cdot\text{CH}_2\cdot\text{CH}_2$; $\text{C}_{10}\text{H}_{21}\cdot\text{CO}_2\cdot\text{CH}_2\cdot\text{CH}(\text{OH})\cdot\text{CH}_2$; $\text{C}_{12}\text{H}_{25}\cdot\text{O}\cdot\text{CO}\cdot\text{CH}_2$; $\text{C}_6\text{H}_5(\text{NO}_2)_2$; and $\text{C}_{10}\text{H}_{21}\cdot\text{CO}\cdot\text{NH}\cdot\text{C}_6\text{H}_5(\text{NH}_2)$. A. W. B.

Treatment of textile materials and preparation of dispersions. H. HUNSDIECKER and E. VOGT (B.P. 428,091, 14.12.33. Ger., 14.12.32).—Monoacyl, C_{10} derivatives of $\text{CN}\cdot\text{NH}_2$ (oleyl, erucyl, ricinoleyl, abietyl), or their salts, are claimed as soaping, wetting, or dispersing agents. A. W. B.

Sizing of [artificial] textile fibres. E. L. J. ARMANET (B.P. 427,926, 21.4.34).—A size suitable for application to skeins of yarn consists of a non-siccative product (*e.g.*, glycerin resinate, beeswax) dissolved in a non-aq., lubricating, volatile solvent, b.p. $150\text{--}250^\circ$ (*e.g.*, petroleum oil, terpene, products). A. J. H.

Dressing of fabrics. RADUNER & Co. A.-G. (B.P. 428,090, 4.12.33. Ger., 17.2.33).—Transparent stiffening effects on fabrics (cotton), more resistant to soaping, are obtained by treatment with gelatinous or albuminous substances, *e.g.*, gelatin, followed by hardening and treatment, in stretched or unstretched condition, with alkali (after drying, *e.g.*, NaOH lye. Increased affinity for direct and acid dyestuffs is claimed. Printed effects are obtained by treatment according to a design, and 2-shade effects by dyeing with a single direct dye, coloured and white effects with acid cotton-reserving dyes, and 2-colour effects by consecutive acid and direct staining. A. W. B.

Application of pigments to fibrous materials. [Delustring artificial silk.] H. T. BÖHME A.-G. (B.P. 424,672, 14.5.34. Ger., 5.7.33).—A white or coloured pigment, *e.g.*, ZnS , $\text{Ba}(\text{OH})_2$, C , Fe_2O_3 , or insol. org. dyestuff, in H_2O suspension is treated with equiv. wts. of electronegatively-charging dispersing agents (I), *e.g.*, quaternary NH_4 salts (containing heterocyclic *tert*-amines and fatty residues C_8 , *e.g.*, $\text{C}_{12}\text{H}_{25}\cdot\text{OSO}_3\text{H}$ and $\text{C}_5\text{H}_5\text{N}$) and of electropositively charging dispersing agents, *e.g.*, fatty (C_8) acids, alcohol sulphonates (from coconut oil), and esters of hydroxyalkyl sulphonates). The flocculate is then peptised with excess of either agent [(I), in hygroscopic solvent, *e.g.*, glycerol]. A. W. B.

Transfer [for decorating silk]. W. S. LAWRENCE, Assr. to KAUMAGRAPH Co. (U.S.P. 1,954,878, 17.4.34. Appl., 16.4.32).—Claim is made for a transfer surface comprising cellulose acetate (170) dissolved in a PhOH resin (200) and a plasticiser, *e.g.*, triacetin (200 pts.), which is sol. in soap solution and capable of penetrating silk-glue under heat and pressure. A. R. P.

Drying apparatus [for laundered articles]. F. B. DEHN. From AMER. LAUNDRY MACHINERY Co. (B.P. 427,592, 18.6.34).

Wetting, detergent, etc. agents. Aq. liquids for textiles etc.—See III. Bleaching wood pulp. Impregnating fibrous materials. [Translucent] cloth.—See V. Glucosides.—See XVII.

VII.—ACIDS; ALKALIS; SALTS; NON-METALLIC ELEMENTS.

Concentration of potash ores of Carlsbad, New Mexico, by ore-dressing methods. W. H. COGHILL, F. D. DEVANEY, J. B. CLEMMER, and S. R. B. COOKE (U.S. Bur. Mines Rept. Invest., 1935, No. 3271, 13 pp.).—The ores, consisting of a mixture of 40 pts. of sylvite (KCl) and 60 pts. of halite (NaCl) with only 2–3% of extraneous matter, have been successfully separated into KCl and NaCl by physical methods. Float-and-sink tests showed that ore crushed to pass 10-mesh could be separated by this means, using heavy liquids (*a*, *b*) with *d* 2.02 and 2.14, respectively. Clean KCl was obtained as float on (*a*) and clean NaCl as sink in (*b*), liquid of intermediate *d* containing the middlings (interlocked grains of both minerals). Saturated brine (*d* 1.23) can be used to concentrate KCl from NaCl , since relative *d* are 1:1.21 compared with 1:1.16 in H_2O . Jigging was unsatisfactory for commercial use, and recourse was had to tabling. Selective filming with a H_2O -repellent medium accelerated the separation, since the KCl is lighter than the NaCl and it also films in preference to the NaCl . Various filming agents were tried in conjunction with oil, and the most satisfactory were found to be alkyl Na or NH_4 sulphates and related compounds. Plain gravity concn. on tables yielded concentrates assaying 82.7% of KCl , with recovery of 69.8%. When fines were treated by flotation, final concentrates were 84.9% of KCl and recovery was 97.3% KCl . The other methods gave higher-grade concentrates and equally good recoveries. D. M. M.

Extraction of Georgia shale and wyomingite with hydrochloric acid [for production of alumina and potash]. S. L. MADORSKY and J. R. ADAMS (Ind. Eng. Chem., 1935, 27, 429–431).—Wyomingite (I) differs from Italian leucite in that the crystals are too small to admit of magnetic concn., and Fe must therefore be dissolved and afterwards separated. It is advantageous to preheat the Georgia shale at 800° ; this is unnecessary in the case of (I). Dissolution is most rapid with boiling acid (10–15% HCl). In a continuous laboratory trial, 66% of the Al_2O_3 and 80% of the K_2O were dissolved. C. I.

Determination of sodium in potassium salts by the uranyl acetate method. F. ALTEN and H. WEILAND (Mitt. Kalifornsch. G.m.b.H., 1933, 75; Bied. Zentr., 1934, A, 5, 265).—Kahane's method (A., 1933, 1024) is

unsatisfactory for this purpose. For the triple salt pptd. from aq. solution, the analysis factor for Na is 0.01536. K is removed by EtOH in preference to tartaric acid. PO_4''' is removed by ammoniacal BaCl_2 . A. G. P.

Ammoniation of double superphosphate. L. M. WHITE, J. O. HARDESTY, and W. H. ROSS (Ind. Eng. Chem., 1935, 27, 562–567).— $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O}$ absorbs up to 12.7% of NH_3 at 25° and 16.2% of NH_3 at 100°, under pressure, the products being CaHPO_4 and $(\text{NH}_4)_2\text{HPO}_4$ (I). $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$ reacts with NH_3 slowly and only at > 40°. The reaction of “double superphosphate” is similar except that the subsidiary reaction, $2\text{CaHPO}_4 + \text{CaSO}_4 + 2\text{NH}_3 = \text{Ca}_3(\text{PO}_4)_2 + (\text{NH}_4)_2\text{SO}_4$, also occurs. Rate of absorption is as with ordinary superphosphate. The product is low in citrate-insol. P_2O_5 as pptd. $\text{Ca}_3(\text{PO}_4)_2$ is partly sol. Heat evolved on ammoniation is sufficient to raise the temp. of the mass to 100° and vaporise 50% of the free H_2O . When cooled, with agitation, the product is granular. Such agitation is also necessary to prevent decomp. of (I).

C. I.

Formation of calcium chloride in salt-deposit liquor. II. Action of chloride solutions on anhydrite. F. KRÜLL (Kali, 1934, 28, 161–165, 173–176; Chem. Zentr., 1934, ii, 3661; cf. B., 1934, 59).—The action of aq. MgCl_2 or NaCl on anhydrite does not lead to CaCl_2 formation. Data for the equilibrium $6\text{CaSO}_4 + 2\text{KCl} + \text{H}_2\text{O} \rightleftharpoons 5\text{CaSO}_4 \cdot \text{K}_2\text{SO}_4 \cdot \text{H}_2\text{O} + \text{CaCl}_2$, and for the effect of NaCl and MgCl_2 on it, are recorded.

H. J. E.

Volumetric determination of free acid in solutions of iron salts. E. MÜLLER and A. ADELSBERGER (Z. anal. Chem., 1935, 101, 178–179).—H⁺ is determined iodometrically by addition of excess of $\text{KIO}_3 + \text{KI}$, and titration of the liberated I. I liberated by Fe^{2+} is determined separately. KIO_3 is best added in successive small amounts during titration, to eliminate the reaction of Fe^{2+} with KI and KIO_3 .

J. S. A.

Volumetric determination of [corrosive] sublimate with lead sulphide. N. A. TANANAEV and V. D. PONOMAREV (Z. anal. Chem., 1935, 101, 185–188; cf. A., 1934, 1191).— HgCl_2 is boiled for 15 min. with excess of an aq. suspension of PbS . The liquid is filtered hot, and PbCl_2 in the filtrate and washings is titrated (phenolphthalein) with Na_2CO_3 .

J. S. A.

Analysis of lead arsenate, with special reference to determination of arsenic content. P. A. BERRY and T. B. SWANSON (J. Australian Chem. Inst., 1935, 2, 105–120).—Current official methods of determining H_2O , acidity, PbO , total As, and H_2O -sol. As are reviewed critically. Modified details of procedure are advocated.

J. S. A.

Stability of hydrogen peroxide solution. P. HORKHEIMER (Pharm. Ztg., 1935, 80, 507; cf. B., 1934, 700).—Diminishing concn. on storage of a 3% H_2O_2 solution, without stabiliser, when it occurs, is usually due to the distilled H_2O used for dilution. H_2O prepared in a tinned-Cu still is unsuitable. H_2O distilled in all-glass apparatus or in a special enamelled-steel still gave a 3% solution the concn. of which remained unaltered for 2 months. In isolated cases the glass of storage bottles promoted decomp.

C. I.

[Gravimetric] determination of water and hydrogen sulphide in gas mixtures. F. FRAAS and E. P. PARTRIDGE (Ind. Eng. Chem. [Anal.], 1935, 7, 198–199).— H_2O is absorbed in $\text{Mg}(\text{ClO}_4)_2$, and H_2S in CuSO_4 previously dehydrated at 160°, the absorbents being inserted between the gas sampling tube and a Toepler pump.

J. S. A.

Water problems in sulphur mining. C. E. BUTTERWORTH (Ind. Eng. Chem., 1935, 27, 548–555).—The mining of S by the Frasch process, in which S (occurring mixed with CaCO_3) is melted by introduction of H_2O at 160°, is accompanied by the removal of “bleed- H_2O ” (B) to avoid excessive pressure underground. Owing to the solids in solution B cannot be reheated and used again. The “mine- H_2O ” is river H_2O softened with $\text{CaO} + \text{Na}_2\text{CO}_3$ at 105° and heated to 160° with live steam in a central power plant. As filter-aid, FeSO_4 is used. The 16-in. line to the S field showed formation of carbonate-silicate scale after 5½ years’ work. This was removed by filling the line with “inhibited HCl ” (14%) at > 35° for 3 days. Vents were provided for CO_2 and the softened SiO_2 was afterwards removed mechanically. B contains H_2S which must be removed before discharge. This is done by aeration with addition of NiSO_4 , CuSO_4 , and CaO (in which case the S appears as elementary S and CaS_2O_3), or by treatment on hurdles (H) with flue gases. In the latter method, $\text{CaH}_4(\text{PO}_4)_2$ is added to prevent deposition of CaCO_3 on the H, and sulphite to prevent S deposition. Many corrosion problems occur.

C. I.

Recovery of sulphur dioxide from waste gases. Equilibrium partial vapour pressures over solutions of the ammonia-sulphur dioxide-water system. H. F. JOHNSTONE (Ind. Eng. Chem., 1935, 27, 587–593).—Partial v.p. of SO_2 and NH_3 over the aq. solutions of the two at various concns. and at 35°, 50°, 70°, and 90° were determined and formulæ relating them to concn. and temp. deduced. The partial pressure of H_2O in such solutions follows Raoult’s law. Presence of ionised electrolytes has practically no effect on the temp.-v.p. relation for SO_2 . Capacity for absorbing SO_2 from a gas containing 0.3% at 35°, with regeneration at 70° or 90° for solutions of various NH_3 concns., is then calc. A max. absorption of 8 pts. of SO_2 per 100 pts. of liquor may be obtained at high NH_3 concns., but absorption is quicker and more complete with more dil. solutions. Loss of NH_3 is calc. to be negligible.

C. I.

Distilling heavy H_2O .—See I. d of CaC_2 .—See II. Determining BO_3''' in soap powder.—See XII. Org. thiocyanates as insecticides.—See XVI. Determining H_2S in sewer gases.—See XXIII.

See also A., June, 703, Causticising of Na_2SO_4 . 707, H overvoltage [in electrolysis of H_2SO_4]. 712, Oxidation of SO_2 in arc discharge. 714, Production of MgCl_2 and $\text{Mg}(\text{ClO}_3)_2$. Prep. of permutit. 715, Prep. of $\text{H}_4\text{P}_2\text{O}_6$, As chloride, PBr_3 , HBr , HgBr_2 , and SO_2Cl_2 . 716, Prep. of $\text{Na}_3\text{H}_2\text{IO}_6$ and H_5IO_6 . Extraction of rarer elements [Ge and Ga from coal ash]. 717, Potentiometric determination of SO_3''' . 718, Determining Se and detecting Te. 723, Heavy H_2O .

PATENTS.

Apparatus for treating gases [in sulphuric acid manufacture]. A. M. HARKNESS, Assr. to GEN. CHEM. Co. (U.S.P. 1,972,932, 11.9.34. Appl., 20.6.30).—SO₂ gases prior to conversion by the contact process are passed through a waste-heat boiler the level of H₂O in (and heating surface of) which is controlled by the temp. of the gases entering the converter. B. M. V.

Aëration of cyanide solutions. E. A. KNAPP and W. R. BATES (B.P. 424,553, 2.10.34).—The solution is passed through a chamber (C) containing numerous small rubber balls which are caused to oscillate in the liquid by intermittent puffs of compressed air passed into C. A. R. P.

Formation of nitrates of metallic elements [e.g., calcium]. H. B. KIPPER, Assr. to R. B. KNOX (U.S.P. 1,954,415, 10.4.34. Appl., 14.9.28).—Highly heated CaO is treated with a mixture of O₂ and N₂ at high pressure, preferably in presence of a catalyst, e.g., Pt-black. A good yield of Ca(NO₃)₂ is said to be obtained at 1200°/2000 lb. per sq. in. A. R. P.

Production of cuprous chloride. E. I. DU PONT DE NEMOURS & Co. (B.P. 425,620, 19.9.33. U.S., 19.9.32).—A solution of CuCl₂ in aq. NaCl (10–30%) is treated with scrap Cu or a Cu alloy at > 80° while a current of N₂ is bubbled through the mixture. The resulting reduced solution is filtered, diluted, and cooled to ppt. Cu₂Cl₂. A. R. P.

Treatment of zinc oxide. S. PERCIVAL. From W. GRILLO HANDELSGES.M.B.H. (B.P. 425,664, 29.6.34).—The fumes from the Zn-burning furnace or retort are passed through a small settling chamber maintained at 500–850° to allow coarse particles to settle before the remainder passes to the collecting chambers. A. R. P.

(A, B) **Production of aluminium fluoride, (B) and double fluorides of aluminium and ammonium.** BRIT. ALUMINIUM CO., LTD., W. E. SIMS, S. F. DERBYSHIRE, and E. J. BLOORE (B.P. 425,693 and 425,908, 20.9.33).—(A) Al(OH)₃ is heated gradually through the range 250–600° in an atm. of HF gas during a period of 1 hr., preferably in a rotary steel or Al kiln. (B) Al(OH)₃ is intimately mixed with 3 mols. of NH₄HF₂ and the mixture heated first at 100–200° to form (NH₄)₃AlF₆, then at 500–600° to expel the NH₄F and leave anhyd. AlF₃. A. R. P.

Composition suitable for use in flotation [of phosphate ores]. A. CRAGO and H. S. MARTIN, Assrs. to PHOSPHATE RECOVERY CORP. (U.S.P. 1,968,876, 7.8.34. Appl., 22.7.32).—A solution of solid fatty acids (from fish, palm, castor, or other fatty oils) in an equal amount of heavy unsaponifiable (fuel) oil is added to the aq. pulp of phosphate ore, which has been pretreated with alkalis. E. L.

Purification of hydrogen [for bright annealing of metals]. A. A. FREY, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,955,328, 17.4.34. Appl., 6.1.31).—The gas is passed over Mg at > 700° to remove S, O₂, N₂, and H₂O. A. R. P.

Separating mixed gases.—See I. **Wood-preserving composition.**—See IX. **Metalloids etc. from compounds.**—See X. **Insecticide.**—See XVI.

VIII.—GLASS; CERAMICS.

Physical purification of quartz sand containing iron. B. GRANIGG (Sprechsaal Keram., 1934, 67, 479–480; Chem. Zentr., 1934, ii, 3816).—Magnetic purification is often possible and may also be applied to the Fe-containing SiO₂ remaining after treating leucite with HNO₃. The product is suitable for glass manufacture. H. J. E.

Conversion of quartz into cristobalite below 1000°, and some properties of the cristobalite formed. S. S. COLE (J. Amer. Ceram. Soc., 1935, 18, 149–154).—Na₂SiO₃ promotes the conversion of quartz (I) into cristobalite (II) at 890–900°, but the product is metastable below 1470° and changes slowly to tridymite. Factors affecting the rate of change (I) → (II) are: temp., time, Na₂O/SiO₂ ratio, grain size. The production of 95% (II) is a commercial possibility. Full physical and X-ray data are recorded. J. A. S.

Melt properties of various raw materials for glass. A. THÜRMER (Keram. Rundsch., 1934, 42, 406–408; Chem. Zentr., 1934, ii, 3542–3543).—Experiments are recorded on the effect, on glass production and properties, of replacing CaO and Al₂O₃ by various raw materials with an equiv. CaO or Al₂O₃ content. H. J. E.

Application of electrical conductivity to the study of separations in molten glasses. M. A. FOËX (Compt. rend., 1935, 200, 1100–1103).—The logarithms of nos. \propto the electrical conductivity in the upper and lower layers of the molten mixture are plotted against composition. The curves are identical when the solution is homogeneous and separate when the formation of two layers takes place. In Ca borate glasses at 1100° the mixture is homogeneous below 1.2 and above 39 mols. of CaO per 100 mols. of B₂O₃. On adding PbO to a mixture of 100B₂O₃ and 10WO₃ at 1100° there is separation until about 50 mols. of PbO are added. If WO₃ is added to a mixture of 100B₂O₃ and 10PbO two layers are also formed; the separation of PbO is practically quant. on addition of 20WO₃. The bottom layer in each case contains a mixture of WO₃ and PbO with some B₂O₃. At 950° a solid ppt. separates. M. S. B.

Testing of glass containers for chemical durability. W. E. S. TURNER (J. Amer. Ceram. Soc., 1935, 18, 135–141).—The following factors influencing the alkali-extraction test need careful consideration: variations of the individual bottle and observer, time of extraction, storage of samples, and the influence of bottle capacity. Visible effects of corrosion are discussed. "Pitting" of the outer surface is initiated by mechanical shocks which injure the surface, and is liable to occur with those 4-oz. bottles giving 5 mg. of Na₂O after boiling for 5 hr. "Flaking" of the interior surface occurs after long keeping at normal temp. and is more pronounced after long storage. Aq. EtOH (especially 40%) solutions extract less Na₂O, but cause more flaking. J. A. S.

Chemical durability of glass. Plea for a standard method of test. W. E. S. TURNER (Bull. Amer. Ceram. Soc., 1935, 14, 165–169).—The "powder" test for chemical durability is discussed in detail and

recommended as the most reliable. The hope is expressed that a method based on those of the Sheffield and the Deuts. Glastechn. Ges. (D.G.G.) methods will be adopted. J. A. S.

Mechanics of enamel suspension. I. Exchangeable base and viscosity measurements on some Vallendar clays. G. E. TERRY and R. M. KING (J. Amer. Ceram. Soc., 1935, 18, 141–144).—The effect of $\text{Na}_2\text{B}_4\text{O}_7$ on untreated and electrolysed clays (H-clay) was studied. Addition of the salt increased the η of untreated clays only after ageing for 168 hr. and at higher concn., but had immediate and gradual effect on the H-clay. The variation in amount of replaceable bases was not sufficient to explain the variation in η , and no factor was found to account for the surface defects in the enamels, which are apparently caused by the clay. J. A. S.

Determination of fineness of grinding of enamel. H. HADWIGER (Glashütte, 1934, 64, 616–618, 629–631; Chem. Zentr., 1934, ii, 3816).—A discussion. H. J. E.

Solubility of clouding agents in enamel. I. Solubility of cryolite. W. DAWIHL (Keram. Rund., 1934, 42, 423–424; Chem. Zentr., 1934, ii, 3421).—The min. concn. of cryolite (I) to produce clouding was determined. Replacement of Na_2O by B_2O_3 increased the solubility of (I). H. J. E.

Loss of fluorine from enamel melts. A. THÜRMER (Keram. Rund., 1934, 42, 433–435; Chem. Zentr., 1934, ii, 3421).—Presence of H in a melt favours loss of F by vaporisation. BF_3 is lost from melts rich in B_2O_3 . SiO_2 has little action. H. J. E.

Enamelling cast-iron stoves. H. J. KARMAUS (Sprechsaal Keram., 1934, 67, 577–579; Chem. Zentr., 1934, ii, 4006).—An enamel (I) with high resistance to temp. change is used. Pb-free (I) is unsuitable, but 30% of PbO may be employed. J. S. A.

Properties of some Ohio red-firing clays. A. E. MACGEE, W. C. O. WHITE, and T. A. KLINEFELTER (J. Amer. Ceram. Soc., 1935, 18, 155–162).—26 clays were examined for all stages of heavy-ware manufacture. Data are recorded for chemical and petrographical analyses, sieve analysis, adsorption, tempering H_2O , base exchange, extrusion behaviour, drying time, shrinkage, strength, heating and expansion curves, porosity, softening temp., etc. J. A. S.

Viscosimetric measurements on clay suspensions. G. D. HOBSON (J. Inst. Petroleum Tech., 1935, 21, 204–220).—Viscosities were determined by noting the time taken for a given vol. of the liquid to flow upward through a capillary under a fixed air pressure. Viscosity is calc. as that of a hypothetical normal fluid which under the same pressure gradient would have the same time of flow; this val. is plotted against mean average velocity. In an alternative method, $V/\pi R^3$ is plotted against $PR/2L$, where V = rate of flow, R and L = radius and length of capillary, P = applied pressure. The equiv. η is dependent on the velocity of flow. The effects of added NaOH or HCl, entrained air, and temp. on η of suspensions containing 2 types of clay have been examined and the results are tabulated and represented graphically. C. C.

Physics and chemistry of firing ceramic ware. J. B. AUSTIN (Bull. Amer. Ceram. Soc., 1935, 14, 157–165).—The drying, H_2O -smoking, oxidation and reduction, and vitrification periods, and the subject of heat transfer are discussed in terms of the fundamental processes. J. A. S.

Permeability of ceramic bodies to gases at high temperature. P. BREMOND (Trans. Ceram. Soc., 1935, 34, 287–297).—Permeability is the sum of the flow through (I) cracks, (II) capillaries having a diam. > the mean free path of the mols., and (III) capillaries of the same order as, or <, the mean free path. The gas flow in case (I) obeys the Torricelli-Graham law, and in (II) depends on viscous flow (Poiseuille's law). Case (III) does not obey Graham's law; the law of Gaede and Knudsen for the flow of gases at very low pressure is more applicable, but even this law is greatly modified by the process of adsorption of the gas on the walls of the capillary. Calculation of the effect is impossible. The practical aspect of these laws is discussed in connexion with the flow of gases through saggars and their influence on the ware. J. A. S.

Manufacture of general and domestic stoneware. N. D. WOOD (Trans. Ceram. Soc., 1935, 34, 269–282).—The various stages and processes of manufacture are briefly described. Typical recipes for bodies and glazes are given. J. A. S.

Use of Dinas bricks. D. BELJANKIN (Zentr. Min., 1934, A, 306–312; Chem. Zentr., 1934, ii, 3421).—Four zones develop in Dinas bricks under working conditions, comprising unchanged material, a zone in which tridymite (I) and pseudo-wollastonite crystallise, a black (I) zone, and the (hottest) cristobalite zone. H. J. E.

Examination of some special refractory materials. M. LÉPINGLE (Engineering, 1935, 135, 245–248, 302–303, 353–355).—The properties (e.g., chemical composition, refractoriness, vol. changes on heating, compressive strength at high temp., thermal and electrical conductivity, and resistance to corrosion and wear), manufacture, and methods of testing of refractory materials (I) are summarised, (I) being classed in 2 groups, viz., (1) the commonly used (I), and special Al_2O_3 - SiO_2 products, which show no deformation under effective load at 1500°, and (2) (I) withstanding temp. > 1500° without deformation under load (e.g., C, corundum, mullite, ZrO_2 , and SiC products). Equilibrium diagrams appropriate to (I) are discussed. Tests on (I) of high Al_2O_3 content (II) [in general, (a) mullite-(I), or (b) (I) containing free Al_2O_3 (corundum or bauxite)] and on ZrO_2 and chromite (I) are described. (II) had high refractoriness and mechanical strength, and were resistant to erosion and to certain fluxes: (a) were characterised by great resistance to thermal spalling (S); (b) Al_2O_3 -bauxite bricks were generally sensitive, but certain products containing bauxite and corundum were resistant, to S. A (German) "dry" process of manufacture of grog and SiC bricks is described, which yields relatively porous, homogeneous (I) of exact dimensions, of high mechanical strength, refractoriness under load, and resistance to erosion and S. A. L. R.

See also A., June, 703, Fusion diagram of system $\text{ZrO}_2\text{--SiO}_2$. 704, Constitution of glasses. 713, Action of molten Li salts on glass. 714, Synthetic spinels.

PATENTS.

(A) Glass-melting furnace. (B) Melting of glass etc. (A) P. L. GEER, (B) P. L. GEER, H. A. MOORE, and W. A. MORTON, Assrs. to (A, B) AMCO, INC. (U.S.P. 1,973,688—9, 11.9.34. Appl., [A] 23.8.30, [B] 1.3.32).—(A) In a tank furnace all the air and fuel is admitted through the back wall, main exhaust ports are situated near the front, and auxiliary exhaust ports are arranged intermediately to control the length of flame. The roof is double, forming an air-preheating space which is divided into cells to permit selective cooling of overheated parts. (B) The construction of the recuperators is further described. B. M. V.

Annealing of glassware. H. A. WADMAN, Assr. to HARTFORD-EMPIRE Co. (U.S.P. 1,974,058, 18.9.34. Appl., 5.4.30).—Addition or subtraction of heat (the former being preferably electrical) near the entrance of a lehr is thermostatically controlled from an early point in the cooling zone, the temp. range at which the thermostat operates being controlled by the temp. at a later point. After relieving strains in the glassware, arrangements are made to abstract heat from the lower parts of, e.g., vessels with thick bottoms quicker than from the walls, both upper and lower return flues for the circulation being provided. B. M. V.

Clay composition and articles made therefrom. C. S. EDMONDSON (B.P. 427,326, 19.10.33).—Common clay is mixed with felspar or quartz, the mixture is calcined to a clinker, pulverised, and after optional addition of cement is moulded and hardened by steam, preferably at ≤ 40 lb. per sq. in. for 5 hr. B. M. V.

Manufacture of ceramic-like articles. N. V. MAATS, TOT BEHEER EN EXPLOIT. VAN OCTROOIEN (B.P. 428,329, 17.4.34. Ger., 28.4.33).—The resistability of articles made of glass is enhanced if the alkalis are removed (wholly or in part) by the action of the autoclave. J. A. S.

Manufacture of a basic refractory. C. E. WILLIAMS and J. D. SULLIVAN, Assrs. to BATTELLE MEMORIAL INST. (U.S.P. 1,954,552, 10.4.34. Appl., 29.7.32).—Claim is made for a mixture of BaO and MgO or calcined dolomite fused in the electric furnace. Mixtures containing 5–35% of BaO do not slake on exposure to moist air after fusion. A. R. P.

Manufacture of refractory bricks or the like from chrome ore. E. LUX, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,973,907, 18.9.34. Appl., 25.1.32. Ger., 24.1.31).—The bricks are formed from reduced Cr ore (A) 90–60% and reduced metallurgical slag (B) 10–40%, moulded with a liquid, e.g., aq. dextrin, and burned. A contains approx. 40% of Cr_2O_3 and B Al_2O_3 73, MgO 23 ($\leq 90\%$ total), $\text{SiO}_2 > 1\%$, and may comprise a waste product from the thermit production of Fe–Cr or Fe–V. B. M. V.

Manufacture of rubber-bonded abrasive articles. R. C. BENNER, Assr. to CARBORUNDUM Co. (U.S.P. 1,969,497, 7.8.34. Appl., 22.7.32).—Abrasive grain

(100 pts.) is mixed with a semi-solid, artificial, aq. dispersion of rubber (< 20 pts.) containing sufficient S for the formation of hard rubber. The mixture is then dried and vulcanised. D. F. T.

Manufacture of waterproof sheet abrasive material. ATLAS-AGO A.-G., Asses. of C. MÜNCH (B.P. 427,627, 27.9.33. Ger., 6.10.32).—One side of unsized paper is treated with a cellulose ester (E) and, after drying, the abrasive is applied to the other side by means of a known adhesive size [e.g., rosin (R) in EtOH] containing also a solvent for E in such quantity that a union of E and R takes place. B. M. V.

Artificial stone.—See IX.

IX.—BUILDING MATERIALS.

Comparison of the behaviour of cements in sea- and fresh water. P. PERIANI (Ann. Lavori pubbl., 1934, 72, 77–84; Chem. Zentr., 1934, ii, 4006).—Only cement (I) with considerable puzzuolanic earth is suitable for use under sea- H_2O . The most resistant (I) had $(\text{SiO}_2 + \text{Al}_2\text{O}_3) : \text{Ca} > 2$. J. S. A.

Corrosion of reinforced concrete under maritime conditions. E. MARCOTTE (Chim. et Ind., 1935, 33, 1053–1060).—Sea- H_2O , peaty H_2O , very pure H_2O , and H_2O derived from either granitic or CaSO_4 terrain cause corrosion of concrete. Methods of avoiding this include artificial carbonating of the surface, addition of volcanic powders, and use of special cements in which (a) SiO_2 is replaced by TiO_2 , SnO_2 , PbO , or P_2O_5 , or (b) CaO is replaced by other bases. W. P. R.

Use of plaster of Paris in dentistry. R. N. JOHNSON (Brit. Dental J., Mar. 15, 1935, 56, Reprint, 10 pp.; cf. B., 1929, 645).—The constitution of plaster and the mechanism of its setting (S) are briefly described, and the effect of plaster- H_2O ratio, time of mixing, and temp. on S time, expansion (E), hardness, and strength has been studied. Certain salts (e.g., KCl, K_2SO_4) increase the S rate and decrease E, whilst others (e.g., borax) retard S and diminish E. By the suitable admixture of the 2 types of salt the plaster may be modified to suit the making of both the impression and the model. The prep. of these retarded and accelerated anti-expansion (A–E) solutions is described in full detail. The S rate of plaster decreases with storage, even in a closed container. These variations are best overcome by maturing the plaster by exposing it in thin layers to the atm. for a few days. The use of the retarded A–E solution gives a mould which has a greater resistance to the destructive action of the steam treatment during the vulcanising process. Hints are given for the accurate temp. control of the vulcaniser. The decomp. of the plaster and the consequent deterioration (including contraction) of the mould during dry-heating (in drying-off and resin-moulding) are discussed. The best medium for separating the mould and impression is prepared by adding an equal vol. of sperm oil to a jelly of Castile soap in H_2O . The separation of the vulcanite denture is facilitated by painting the mould with cellulose acetate solution (“Cellace”). J. A. S.

Hydraulic binding agents and their application. R. RASCH (Chem.-Ztg., 1935, 59, 453–456).—A review.

Zeolitic nature of trass. K. BIEHL and W. WITTEKINDT (Tonind.-Ztg., 1934, 58, 499–501, 515–516; Chem. Zentr., 1934, ii, 3544).—Experiments on the base-exchange properties of various trasses are described. They are compared with the zeolites, which normally show much less exchange. H. J. E.

Paraffin-impregnated wood. Resistance to water and sulphuric acid solutions. J. WIERTELAK and J. CZARNECKI (Ind. Eng. Chem., 1935, 27, 543–547).—Alder wood impregnated with paraffin wax (I) by the open-tank method at 71–135° or in an autoclave at $> 105^\circ$ absorbed 90–100% of its dry wt. (I) fills only cell cavities and therefore the wood can still absorb H_2O . It also absorbs H_2SO_4 with formation of $AcOH$, and (I)-impregnated wood could not therefore be used for storage-battery containers. Such wood has 3 times the surface hardness of air-dried wood and this is not affected by 1–2% H_2SO_4 solution though it is reduced by more conc. solutions. C. I.

Shrinking and swelling of wood. A. J. STAMM (Ind. Eng. Chem., 1935, 27, 401–406).—On drying green wood no change in external dimension occurs until the moisture content has fallen below that of the fibre-saturation moisture content (27–32% on dry wood, according to species). Below this, shrinkage (S) is greatest in a direction tangential to the annual rings and negligible longitudinally. The S in vol. of small sections of wood dried under conditions of min. stress varies approx. as the bulk d of the sections, with but slight changes in the proportionality const. for different species. The change in diam. of the fibre cavity during drying is small. If the wood is dried under conditions which set up stresses the above relation does not hold. In conc. aq. salt solutions wood swells beyond its normal H_2O -swollen dimensions. The swelling of wood in dry org. liquids is generally $<$ in H_2O , decreasing with decreasing polarity of the liquid, but non-polar liquids can be made to replace H_2O in swollen wood with little change of dimension if the replacement is done by suitable steps. This principle has been used to deposit non-volatile H_2O -insol. waxes and resins in wood. When the swollen wood in which H_2O has been replaced by an org. liquid is dried normal S occurs. D. K. M.

Fireproofing of wood. I. Apparatus for determining the ignition point of wood. S. UCHIDA, S. AI, and J. NAGASAWA (J. Soc. Chem. Ind., Japan, 1935, 38, 166–167 B).—The ignition temp. (I) is taken as that at which the gases evolved from the wood sample, which is heated slowly in an electric furnace, are ignited by an electric spark. Good replication of the vals. of the (I) is obtained. A. L. R.

Dinas bricks.—See VIII.

PATENTS.

Burning of cement slurry. A. BUSCH (U.S.P. 1,954,401, 10.4.34. Appl., 25.11.32. Belg., 11.12.31).—The slurry (S) is sprayed into a rotating kiln (K) slightly inclined to the horizontal and containing internal deflectors to cause the S to spray on to the hot walls. K is heated by a stream of hot gases passing counter-current to S . A. R. P.

Manufacture of cement, mortars, and concretes. A. O. PURDON (B.P. 427,227, 23.4.34. Belg., 24.4. and 12.12.33).—(a) High-early-strength cement (A) is made from pulverised, granulated blast-furnace slag, and activated either with 5–8% solution of $NaOH$ (I) or 7–11% of KOH (II), dissolved in the gauging- H_2O (B), or with materials producing (I) or (II) by reaction in B . (b) In mortars and concretes, progressive increase in strength with age, $>$ normal, is obtained by use of crushed air-cooled slag as aggregate, with A and (I) or (II). T. W. P.

Manufacture of pozzuolana cements. H. WAGNER, Assee. of R. SIEMERING (B.P. 424,614, 5.10.34. Ger., 23.10.33).—Hot Portland cement clinker (I) is passed directly from the kiln to a rotary drum in which it is mixed with the necessary clay (II) in such a way that the heat of (I) serves to burn (II) at about 650°. The product is then ground, preferably after addition of $Ca(OH)_2$. A. R. P.

Acid- and water-proof cement. F. D. SNELL (U.S.P. 1,973,731, 18.9.34. Appl., 6.10.30).— SiO_2 - Na_2SiO_3 cement is rendered harder and denser by addition of $Al(OH)_3$ or $Ca(OH)_2$ and Na_2SiF_6 , the total additions being 0.5–2.0% of the cement. B.M.V.

Manufacture of floors of magnesium cement. P. VAN RIJSWIJK (B.P. 426,853, 6.7.34).—An upper layer composed of 1 pt. by wt. of MgO , $<$ 2 pts. of saturated aq. $MgCl_2$, and filling material is cast on a porous underlayer. T. W. P.

Manufacture of artificial stone from chamotte or grog. W. W. GROVES. From DR. C. OTTO & CO. G.M.B.H. (B.P. 427,781, 23.10.34).—A 1:1 mixture of coarse (C) ($>$ 3 mm.) and fine ($<$ 0.5 mm.) grog or fine clay burned at 1000°, C being first treated with thin clay slip, is moulded, dried, and burned. B. M. V.

Production of stone-wood masses for floor-covering. E. EICHERT (B.P. 426,739, 31.10.33. Ger., 17.11.32).—A 1:9 mixture of $Na_2S_2O_3$ and $CaCO_3$ is added to plaster of Paris containing sawdust or cork filler. The proportions 1:5:4 (by vol.) respectively are preferred. T. W. P.

Manufacture of cold-laid pavement. C. M. BASKIN, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,973,599, 11.9.34. Appl., 28.2.31).—Asphalt is mixed hot with anhyd. emulsifying agent, and the mixture (M) is shipped to the point of usage and there mixed in an ordinary pug mill or the like with alkaline H_2O (0.1–1.5% aq. $NaOH$). If aggregate is to be incorporated it is charged to the mixer first, and then the alkaline solution and finally M are sprayed in. B. M. V.

Preparation of a composition for preservation of wood, timber, etc. G. GUNN (B.P. 425,781, 24.11.33).—The impregnating solution contains $K_2Cr_2O_7$ (5.6), $CuSO_4$ (5), and $Cr(OAc)_3$ (0.53%), with or without a small quantity of $AcOH$. H_3BO_3 and $NH_4H_2PO_4$ may be added when a fireproofing mixture is required. A. R. P.

Colouring of (A) wood veneers and the like, (B) wood. SINGER MANUFG. CO. (B.P. 427,069 and 427,154, [A] 25.6.34, [B] 11.7.34. Can., [A] 24.6.33,

[B] 8.9.33).—(A) Wood veneers, previously dried and heated in a closed vessel, are treated with preheated NH_3 . (B) Wood maintained at 100° , under reduced pressure in a closed vessel, is treated with a forced circulation of NH_3 . Compressed air is introduced at a predetermined stage to prevent further evaporation of H_2O from the wood. T. W. P.

Artificial lumber. G. WITTY, Assr. to O. J. KALT (U.S.P. 1,974,227, 18.9.34. Appl., 28.9.33).—The lumber is composed of MgO 30, Al_2O_3 20, sawdust 50, and beach sand 10 pts. It is moistened with MgCl_2 and Ca Mg chloride and after forming is dipped in a solution of MgSiF_6 and K_2SO_4 . B. M. V.

Road-tar mixtures.—See XIV.

X.—METALS; METALLURGY, INCLUDING ELECTRO-METALLURGY.

Calculation of the metal charges for the foundry cupola. H. L. CAMPBELL (Met. & Alloys, 1935, 6, 107—112).—Graphical methods of proportioning mixtures are illustrated and examples given of arithmetical methods based on assumed loss by oxidation figures for the elements concerned. E. H. B.

Use of an oxygen-enriched blast in blast-furnace practice. W. LENNINGS (Stahl u. Eisen, 1935, 55, 533—544, 565—570).—The available heat for a given quantity of coke is increased by use of an O_2 -enriched blast, and less heat is wasted because of the diminished mass of blast-furnace gas. The speed of working is increased, as is also the difference in temp. between the gas and the charge. The possibility of producing a blast-furnace slag of similar composition to Portland cement is discussed. W. P. R.

Heat-treatment in controlled atmospheres, including gaseous carburising. C. R. AUSTIN (Trans. Amer. Soc. Met., 1935, 23, 157—184).—The application of batch-type annealing and continuous normalising, in atm. of H_2 , N_2 , steam, and natural gas, to low-C steel, stainless steel, Cu, brass, and Si steels is discussed. W. P. R.

Improvement of grey cast iron. H. KERN and A. LISSNER (Bull. Assoc. techn. Fond., 1934, 8, 322—330; Chem. Zentr., 1934, ii, 3669).—Carbides are partly decomposed at 800 — 850° , finely-divided graphite being formed on slowly cooling. Part of the carbide dissolves at 800° , martensite being formed on quenching. Annealing at 500° gives sorbite or, at 700° , sorbitic pearlite. H. J. E.

Physical properties of austenitic low-carbon nickel-manganese cast iron. G. R. DELBART and E. LECOEVRE (Bull. Assoc. techn. Fond., 1934, 8, 279—288; Chem. Zentr., 1934, ii, 3669).—On annealing at 500° of a cast Fe (free C 1.65, combined C 1, Si 1.81, Mn 3.75, Ni 6.5%), austenite is transformed into martensite. Changes in mechanical properties with varying annealing times and temp. were measured. H. J. E.

Metastability of cementite. H. A. SCHWARTZ (Trans. Amer. Soc. Met., 1935, 23, 126—149).—In an Fe-C alloy containing 0.03% of Si and $\geq 0.04\%$ of other elements, the reaction $\text{Fe}_3\text{C} \rightleftharpoons 3\text{Fe} + \text{C}$ proceeds

to the right at all temp. from 630° to the m.p. of the eutectic. W. P. R.

Structure and formation of lamellar pearlite. N. T. BELAIEV (Rev. Mét., 1935, 32, 145—155).—The lamellar character of pearlite (P) is not typical of most eutectics and eutectoids. The influence of the ferrite (F) in determining the orientation of the P grain is exerted through both its mass and the slope of the F separation line in the Fe-C diagram. There is a simple relationship between the mean diam. (D) of the P grain and the interlamellar spacing. By sectioning at an appropriate angle to the lamellae the structure of the F and the Fe_3C can be studied. The existence of cubic etch figures in the F limits D to 300—350 μ . The crystallisation of the Fe_3C lamellae is extremely rapid, but without effect on the orientation of the P grain. The rate of cooling determines D and there is a linear relationship between D and the Brinell hardness of the steel. W. P. R.

Blue and black coloration of iron in fused salt baths. H. KRAUSE (TZ. prakt. Metallbearb., 1934, 44, 308—309; Chem. Zentr., 1934, ii, 3040—3041).—A nitrate bath (I) gave light or dark blue, and a nitrite bath at low temp. a brilliant black, colour on Fe. Fused NaOH coloured Fe or steel matt-grey or brown. Addition of 5—10% of MnO_2 to (I) gave blue-black, 5% of Na_2O_2 deep black, and 5—10% of NaBO_3 blue-black to matt-black colours. Cr compounds gave no satisfactory results. H. J. E.

Effect of oxygen and sulphur on iron in scaling. J. H. WHITELEY (Iron and Steel Inst., May, 1935. Advance copy, 19 pp.).—Specimens of electrolytic Fe, Armco Fe, and acid and basic steel when heated in air to 700 — 1050° develop below the scale a layer ≥ 0.003 in. thick which when etched reveals a network pattern following either the α - or γ -boundaries, according to the temp. This structure is primarily due to O_2 and disappears by diffusion when heated in absence of O_2 at the higher temp. of the α -range or in the γ -range. The structure, which is also found in welds, is weak in pure Fe, apparently being intensified by S, and is thought to be related to the banded structure of ferrite. E. H. B.

Acid corrosion of technical iron in presence of sulphur dioxide. V. A. KARNITZKI and N. A. GOLUBEV (Korros. u. Metallschutz, 1934, 10, 190—195; Chem. Zentr., 1934, ii, 4016).—Corrosion (I) of technical Fe in H_2SO_4 or HCl is strongly promoted by dissolved H_2S or SO_2 , SO_2 being more effective in H_2SO_4 . The velocity of (I) $\propto [\text{SO}_2]$ and depends on $[\text{H}^+]$, being a max. in 30% H_2SO_4 . J. S. A.

Does pressure promote rusting of iron? A. BAADER (Korros. u. Metallschutz, 1934, 10, 235—241; Chem. Zentr., 1934, ii, 4016).—Boiler condensate promotes rusting $>$ does spring H_2O . Rust coatings consist of a lower (Fe'') and an upper (Fe''') oxide layer, the amounts depending on the H_2O used. The influence of constructional factors on boiler corrosion is reviewed. J. S. A.

Origin of flakes in steel. H. BENNETT, H. SCHENCK, and H. MÜLLER (Stahl u. Eisen, 1935, 55, 321—329).—The influence of gases in solid solution is an important

factor in the development of flakes in forged alloy steels. H_2 is especially dangerous since there is a rapid decrease in its solubility with falling temp. Its effect is also apparent in other steels besides the well-known alloy steels which are very susceptible to the development of flakes on forging. O_2 and N_2 do not have the same effect as H_2 because of their small solubility in solid steel. Their presence in molten steel gives rise to other defects such as blowholes in the cast metals and conchoidal fractures in forgings. In addition to flakes, other defects such as intercryst. cracks along the primary grain boundaries may be caused by the internal pressure of H_2 in solid solution. W. P. R.

Oxidation of a low-carbon steel in the temperature range 900–1150°. C. A. SIEBERT and C. UPTEGROVE (Trans. Amer. Soc. Met., 1935, 23, 187–216).—A decrease in the amount of scaling with rising temp. in the range 1010–1095° occurs in a 0.2% C steel, and the Fe^{II} content of the scale undergoes a similar reversal in the same temp. range. The reversal occurs from very low $[O_2]$ to 100% O_2 . The change in the degree of oxidation is accompanied by an alteration in the scale structure. W. P. R.

Residual metals in open-hearth steel. J. D. SULLIVAN (Met. & Alloys, 1935, 6, 134–137).—Samples taken from the basic open-hearth furnaces of 15 steel producers in U.S. and Canada indicate that on an average Mn 1.7, Cu 1.4, Ni 0.5, Cr 0.3, and Sn 0.1% are present in the molten steel before alloy additions are made. Of these impurities Ni, Cu, Cr, and Sn are derived almost entirely from scrap. During the past year the Cu figures have risen somewhat. Analytical methods for small amounts of the above impurities are described in detail. E. H. B.

Non-metallic inclusions in steel. I. Products of deoxidation. S. F. URBAN and J. CHIPMAN (Trans. Amer. Soc. Met., 1935, 23, 93–109).—A series of melts were deoxidised by means of ferro-manganese and -silicon, silico-manganese, zirconium-ferro-silicon, Ca silicide, Ca-Si-Al, ferro-chrome, and Al, and the resulting inclusions in the steel examined microscopically. Small additions of Si produce Fe^{II} silicate type of inclusion, but large additions result in pure SiO_2 . Ferrochrome gives a chromite and not Cr_2O_3 , and Al a complex Fe^{II} aluminate inclusion and not Al_2O_3 . W. P. R.

Effect of deoxidation on some properties of steel. C. H. HERTY (Trans. Amer. Soc. Met., 1935, 23, 113–121).—Grain size, rates of transformation, impact strengths at room and low temp., and ageing characteristics for a steel of given composition can be changed by variation in the method of deoxidation of the molten steel. W. P. R.

Spring steels. J. H. ANDREW and G. T. RICHARDSON (Iron and Steel Inst., May, 1935. Advance copy, 21 pp.; cf. B., 1931, 1053).—Of 3 spring-steels containing (A) C 0.45, Si 2.02, Mn 0.76%, (B) C 0.6%, (C) C 0.52, Cr 1.27, V 0.25%, A is the most susceptible to surface decarburisation during manufacture of heat-treated spring plates from billets. The scale formed on A is friable and less protective than that on B or C. Surface decarburisation is reduced by a high initial soaking temp.

and large rolling reduction per pass. A is very susceptible to mass effect in hardening and requires a high quenching temp. to produce uniform hardening. C is less susceptible to temp., is easily treated to give uniform hardness, and appears, in general, to be the most satisfactory spring material from the metallurgical viewpoint. E. H. B.

Resistance of spring steels to repeated impact stresses. G. A. HANKINS and H. R. MILLS (Iron and Steel Inst., May, 1935. Advance copy, 11 pp.).—Repeated impact tests on unnotched specimens of Si-Mn and Cr-V spring steels which had been hardened and tempered to give (i) irregular decarburisation at the surface, (ii) slight carburisation, and (iii) even distribution of carbide, showed that the normal decarburised surface produces a low impact-endurance limit (10^6 impacts), but has no adverse effect on the resistance to a few large impacts. E. H. B.

Ageing of mild-steel wire. J. C. HUDSON (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 191–199).—Wires of mild steel (C 0.22, Mn 0.60, Si 0.04%) that have been drawn to 24% reduction after annealing show an increase of 3.7% in breaking load after ageing for 1 year, but no change occurs in wires reduced by 75%. It appears, therefore, that the change in mechanical properties of hard-drawn wires on ageing is determined to some extent by the degree of previous cold-working. A. R. P.

Properties, characteristics, and uses of stainless steel. S. A. MAIN (J. Soc. Arts, 1935, 83, 672–700).—A lecture.

Addition elements in stainless steels. E. PRETET (Chim. et Ind., 1935, 35, 1061–1063).—The rôle played by addition elements such as Ti, W, Mo, Al to stainless steel depends on the manner in which they affect the constitution of the steels. They may (1) enter into solid solution and affect the character of the basic solid solution, e.g., Al in ferritic Fe-Cr steels; (2) ppt. a second constituent, e.g., W or Mo, in austenitic steels; or (3) determine the grain size and other properties by the pptn. of non-metallic particles during solidification. W. P. R.

Determination of sulphur in plain and alloy steels. Perchloric acid modification of Meineke's method. L. SILVERMAN (Ind. Eng. Chem. [Anal.], 1935, 7, 205).—Meineke's procedure is followed, but HNO_3 is removed by a single evaporation with $HClO_4$ instead of with HCl. J. S. A.

Welding of carbon steels with resistance-heating. F. HASA and A. BENEŠ (Sborn. Masaryk. Akad. Práce, 1934, 8, No. 1, 29–85; Chem. Zentr., 1934, ii, 3834).—The effect of C content (0.21–1.28%) on the welding of C steels has been studied. Changes in microstructure and in mechanical properties are discussed. H. J. E.

Welded chemical equipment from special metals. E. P. POSTE (Ind. Eng. Chem., 1935, 27, 128–134).—Arc-welded, low-C steel is unsuitable in itself for the construction of pressure vessels working at temp. $> 600^\circ$ (owing to loss of creep strength) or at subnormal temp., when it is brittle. At higher temp. Cr-Ni steels, stabilised against intergranular corrosion by Ti, are specified.

Welding of these requires a weld metal and flux which will give a weld agreeing with the plate in both chemical structure and physical properties. Corrosion-testing by immersion in HNO_3 is desirable. Stabilisation with Ti increases welding difficulties. For low temp. an 18:8 Cr-Ni steel or a 3% Ni steel are suitable. Ni- and stainless steel-clad steels can be welded if working at moderate pressure and temp. Their field is where chemical corrosion is a main factor. Welds in pressure vessels should undergo X-ray examination. Welded vessels chiefly for use in the petroleum industry are described and illustrated. C. I.

Corrosion of ships' hulls by lower sea fauna. C. BÄRENFÄNGER (Umschau Wiss. Techn., 1934, 38, 711—713; Chem. Zentr., 1934, ii, 4016—4017).—A review of the use of anti-fouling compositions. J. S. A.

Attack of steels by hydrogen and hydrogen sulphide at high pressure and elevated temperature. H. VOLLBRECHT and E. DITTRICH (Chem. Fabr., 1935, 8, 193—196).—Observations are recorded on the corrosion of two steel (I) containers (C 0.4, Ni 3—4, Cr 0.8—1.0%) by H_2 and H_2S at 200 atm. and a wall temp. of 300°. H_2 penetrates deeply into (I) and removes C. Penetration by H_2S is much less. Formation of FeS protects (I) from further attack by H_2 . H. J. E.

Behaviour of rustless steel towards corrosion. W. PALMAER (Korros. u. Metallschutz, 1934, 10, 181—190; Chem. Zentr., 1934, ii, 4016).—A lecture. The resistance of Cu steels is explained on the local-element theory. J. S. A.

Corrosion of steel sleepers in mines. ANON. (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 207—210).—Corrosion of steel sleepers should be negligible in mines with an average R.H. of < 80% and free from H_2O . Appreciable corrosion may occur in pits where there is running H_2O , especially when it contains S acids or NaCl. A. R. P.

Corrosion tests on wires by the decrease in breaking load method. (Second series.) J. C. HUDSON (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 185—190; cf. B., 1934, 886).—Notes on the prep. of numerous specimens for atm. corrosion tests of wires are given. A. R. P.

Field tests on atmospheric corrosion [of steel]. J. C. HUDSON (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 5—72; cf. B., 1934, 887).—Further examinations of specimens of numerous ferrous metals after exposure for 2—4 years at stations in various parts of the world covering all types of atm. have shown that the normal rolling scale (S) on British wrought Fe is more resistant to weathering than is that on mild steel; loss-in-wt. tests after exposure for 1 year at Sheffield indicate that corrosion is mainly determined by the character of the S. The presence of Cu in mild steel and Swedish Fe also greatly reduces corrosion in all atm. In all the specimens tested, corrosion was much more marked in those exposed at British stations than in those exposed overseas. The results obtained on painted specimens, although not yet conclusive, indicate that the use of an inhibitive priming coat, e.g., red lead, is decidedly advantageous. A. R. P.

Marine corrosion [of steel]. II. Tests on steel plates built into the barge "Cactus." J. C. HUDSON and R. H. MYERS. III. **Examinations of the steel pontoons supporting the landing stage at Gosport.** R. H. MYERS. IV. **Corrosion tests on welded ships' plates.** ANON. (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 75—89, 91—100, 101—107; cf. B., 1934, 887).—II. The behaviour of steel plates, of various compositions and made in different ways, built into the shell and hatch-plating of a river cement barge has been examined over about 1 year. Indications were obtained that plates finished at a low rolling temp. as a result of discontinuous rolling lost their protective scale somewhat more readily than plates rolled in the normal way. Plates painted with white lead while still hot from the mill have behaved very well and preliminary descaling by sandblasting appears to be beneficial in the case of hatch-plating.

III. Pitting of the steel pontoons of a floating landing-stage has been shown to be due to insufficiently frequent renewal of the protective coating; > 3—4 years should elapse between successive paintings with a bituminous paint.

IV. Tests in sea-air, sea- H_2O , and in air-sea- H_2O of electrically welded specimens of an ordinary and a high-tensile steel over 30 months showed that the use of a correct welding procedure for joining ships' plates is unlikely to cause any corrosion troubles. A. R. P.

Design, interpretation, and uses of standard corrosion tests in salt solutions and industrial waters. G. D. BENGOUGH and F. WORMWELL (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 123—172).—A standard apparatus and procedure are described for making corrosion (C) tests in stagnant salt solutions in an atm. of O_2 or air under carefully controlled and reproducible conditions. Probably the most important factor in deciding the rate of C of steel is the rate of supply of O_2 ; under apparently stagnant conditions the principle vehicles of supply appear to be thermal and Adeney convection currents, except under conditions of very shallow immersion where diffusion is the principal factor. Standard types of C/time (C/T) curves in various NaCl and KCl solutions taken over periods up to 3½ years consist of several branches the slopes of which are controlled by the physical condition of films or masses of C products which modify the electrode potentials and form resistances in the C cell circuits. Evolution of H_2 (E) is of general occurrence in the C of Fe in aq. chlorides, being particularly marked in 0.5N- NH_4Cl and in sea- H_2O ; in 0.5N-NaCl the C due to E may reach one third of the total when a narrow vessel is used. C rates are modified by changing the size of the vessel or the atm. above the solution; under some conditions substitution of O_2 for an air atm. provides an accelerated test over long periods, but in very dil. aq. NaCl quite different C/T curves are obtained in the two atm. Evidence is adduced to show that environmental factors are more important than are local changes in the composition of the metal in causing pitting. A. R. P.

Metallurgical factors influencing the probability of corrosion of iron and steel. R. B. MEARS (Iron and

Steel Inst., 3rd Rept. Corrosion Commee., 1935, 111—121).—The corrosion probability (I) of Fe and various steels has been determined by the drop method, using 0.15*M*-NaHCO₃ (II). For metal with a scale coating (I) depends chiefly on the physical characteristics of the scale, being small when continuous and much higher when imperfect, loose, or scratched. On the impure core of a high-S rimming steel the % no. of drops of (II) which cause rusting is > on the outer (purer) rim when the metal has been polished on fine emery, but no difference is observed when a coarse emery has been used; this supports the theory that impurities confer special susceptibility to attack only on smooth surfaces. The presence of particles of FeS or MnS in drops of H₂O on the steel surface greatly increases (I) irrespective of whether they are in contact with the metal or not. Particles of haematite have a similar but much less marked effect, whereas particles of sand, Al₂O₃, or graphite are inert. Small quantities of H₂S increase the (I) of Fe in 0.005*M*-NaHCO₃ much > do similar amounts of H₂SO₄. A. R. P.

Orders of merit of ten ferrous materials exposed in different conditions to corrosion at different stations. K. G. LEWIS and U. R. EVANS (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 177—183).—Specimens of 10 ferrous metals have been exposed for 2—5 years in London, Cambridge, and in the country in the unpainted, single-painted, and double-painted conditions, and with and without previous removal of mill-scale. The results show that painting and mill-scale have a slight effect in determining the order of merit, but that climatic conditions have a much greater effect, the rate of corrosion in the 3 localities decreasing in the above order. In all the conditions austenitic Cr-Ni steel gave the best results and ingot Fe the worst, steels containing Cu behaved better than Cu-free steels, and specimens painted after removal of scale better than those painted on the scale. A. R. P.

Subsidiary paint tests [on iron surfaces] at Birmingham and Farnborough. J. C. HUDSON (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 201—205; cf. B., 1934, 886).—Painting over a pickled surface has marked advantages over painting over a weathered and partly descaled Fe surface. Outer coatings of white-Pb deteriorate rapidly on long exposure, but a priming coat of this paint is superior to one of PbCrO₄ or Pb₃O₄. A. R. P.

Effect of mill-scale on the rising of paint. K. G. LEWIS and U. R. EVANS (Iron and Steel Inst., 3rd Rept. Corrosion Commee., 1935, 173—176).—On exposure for some time to outside weather conditions paint applied to Fe covered with an intact scale shows undermining at the paint-line with some rising at various parts of the surface. This rising is much more pronounced when the scale has been partly removed by weathering before painting, especially when an oil-rich paint is used. No rising occurs when the paint is applied to a surface from which the scale has been removed by pickling, grinding, or weathering. A. R. P.

Protection [of metals] against corrosion. W. SCHNEIDER (Chem. Fabr., 1935, 8, 191—192).—A lecture. H. J. E.

Determination of small amounts of lead in copper. B. PARK and E. J. LEWIS (Ind. Eng. Chem. [Anal.], 1935, 7, 182—183).—Cu is dissolved in HNO₃, and an excess of aq. NH₃ added. Na₂HPO₄ + (NH₄)₂CO₃ are added, and then CaCl₂. Pb is pptd. as Pb₃(PO₄)₂ together with Ca₃(PO₄)₂ + CaCO₃. The ppt. is dissolved in HCl, and Pb is repptd. as PbS from the neutralised solution. Pb in the ppt. is determined spectroscopically. 10⁻⁶ pt. of Pb in Cu may be so determined. J. S. A.

Copper determination by α -benzoinoxime in copper-molybdenum alloy steels. H. A. KAR (Ind. Eng. Chem. [Anal.], 1935, 7, 193).—Cu is pptd. as CuS from the H₂SO₄ solution of the steel. The ppt. is converted into CuO by ignition, and dissolved in HCl. The solution is made alkaline with NH₃, and Cu is pptd. with α -benzoinoxime (cf. B., 1923, 1204 A). Modified procedures are given for use in presence of V and W. J. S. A.

Influence of conditions of roasting on the gold yield from Reichenstein arsenic ores. J. FISCHER and V. TAFEL (Met. u. Erz, 1934, 31, 393—395; Chem. Zentr., 1934, ii, 3832).—The effect of the roasting temp. and atm. on the Au yield (I) from a concentrate with As 49.45, S 4.05, Fe 24.56%, and Au 26.30 g. per ton was studied. (I) was increased by reducing the quantity of air at 500—1000°. The cause of the Au losses is discussed. H. J. E.

Assay of silver residues. P. KÖHRING (Metallbörse, 1934, 24, 1082—1083; Chem. Zentr., 1934, ii, 3831).—A description and discussion of available methods. H. J. E.

Preparation of lead and lead-rich alloys for microscopical examination. W. H. BASSETT, JUN., and C. J. SNYDER (Met. & Alloys, 1935, 6, 125—129).—The prep. of Pb and Pb alloys not containing hard constituents has been simplified by use of etching reagents which remove evenly comparatively thick layers of cold-worked metal. Recommendations are made for cutting, grinding, and polishing technique and of a variety of etching reagents. E. H. B.

Gases in metals, especially non-ferrous metals. W. KOCH (Z. techn. Physik, 1934, 15, 280—284; Chem. Zentr., 1934, ii, 3833).—Gas samples removed from metals by melting in vac. were measured and analysed. The gas content of Al (mainly H₂) was 1—2 c.c. per 100 g. That of electrolytic Zn was \propto the square root of the c.d. during electrolysis. Relations were found between the solubility of H₂, N₂, CO, and CO₂ in Cu alloys, and their constitution. H. J. E.

Separation of aluminium-iron-silicon eutectic in pure aluminium. H. RÖHRIG and E. KÄPERNICK (Metallwirts., 1934, 13, 591—593; Chem. Zentr., 1934, ii, 3672).—Separation of very small globules of Al-Fe-Si eutectic was observed in 99.5% pure Al. This separation occurs if the rate of cooling is great enough to hinder separation into the two eutectic components (Al₆Fe₂Si₃ and Si). In alloys with a high Si and Fe content the normal rate of cooling is too slow for the above separation to occur. H. J. E.

Dependence of the reflecting properties of aluminium and its alloys on the surface treatment. HASE (Aluminium, 1934, 17, No. 9, 20—25;

Chem. Zentr., 1934, ii, 3430—3431).—Reflexion data are recorded and correlated with surface treatment.

H. J. E.

Corrosion-resistance of silumin. G. ECKERT (Aluminium, 1934, 17, No. 9, 31—34; Chem. Zentr., 1934, ii, 3431).—Silumin with a high Cu content is unlike Al in being resistant to boiling fatty acids of high mol. wt., and to boiling NH_2Ph and BuOH . It resists hot linseed oil.

H. J. E.

Measurement of the internal friction of metals.

A. RADEMACHER and F. SAUERWALD (Mitt. Forsch.-Anst. Konz. Gutehoffnungshütte, 1934, 3, 124—140; Chem. Zentr., 1934, ii, 3431).—Experimental methods are described and discussed.

H. J. E.

Metallurgy of arc-deposited weld metal. S. L. HOYT (Trans. Amer. Soc. Met., 1935, 23, 61—84).—Weld-metal (W) made from bare electrodes has inferior properties to those of the metal which it joins together. It contains 0.02% and 0.15% and has consequently comparatively high tensile strength but low ductility. Practically all the O is present as FeO . The N produces a pearlitic structure and there is always a sharp line of demarcation between W and the metals joined. Weld metal (W_1) made from cellulose-covered welding rods contains 0.06% and 0.010%, and the Mn content is as high as in the welding rod. The hardness and ductility of W_1 approach those of good mild steel. Fractional O determinations indicate that most of the O is present as SiO_2 and Al_2O_3 and W_1 may be considered to be well-deoxidised steel. Age-hardening effects occur in both W and W_1 .

W. P. R.

Nickel-plating. M. SCHLÖTTER (TZ. prakt. Metallbearb., 1934, 44, 71—72; Chem. Zentr., 1934, ii, 3673—3674; cf. B., 1932, 845).—The throwing power (I) of 7 Ni-plating baths of varying composition has been calc. from conductivity and polarisation data. Salts such as MgSO_4 do not increase (I), but increase the no. of metal nuclei, and hence improve the density and uniformity of the deposit.

H. J. E.

Permanence of galvanos and stereotypes.

A. ROVIRA (Gac. Artes grafic., 1934, 12, No. 7, 11—12; Chem. Zentr., 1934, ii, 3439).—Cu-galvanos are attacked by printing colours containing S or Hg. Ni-plating is recommended.

H. J. E.

Electrothermal production of magnesium.

F. HANSGIRG (Berg- u. hüttenmänn. Jb. montan. Hochschule Leoben, 1934, 82, 109—112; Chem. Zentr., 1934, ii, 4015—4016).—Reduction of MgO with C in the electric furnace takes place above the b.p. of Mg, and leads to the reversible formation of $\text{Mg} + \text{CO}$ in the vapour phase. On cooling, only $\text{MgO} + \text{C}$ results, but at 2200° equilibrium lies on the Mg side.

J. S. A.

Gilding of aluminium. W. FRÖLICH (Metallbörse, 1934, 24, 1146—1147, 1179; Chem. Zentr., 1934, ii, 3835).—The Al is cleaned mechanically and then by treatment for 1 min. at 90° with a solution of $\text{Na}_2\text{B}_4\text{O}_7$ 15, Na_2CO_3 8, NaOH 2, and NH_4Cl 2 g. in 1 litre of H_2O . The specimen is washed, treated for 25 sec. at $\geq 21^\circ$ with a solution of 1 litre of H_2SO_4 , 1 litre of HNO_3 , and 15 g. of FeCl_2 in 60 c.c. of H_2O , and washed. It is then brass-plated at 21° [bath: $\text{Cu}(\text{CN})_2$ 15, $\text{Zn}(\text{CN})_2$ 3.8, NaCN

22.5, KOH 15 g. in 1 litre of H_2O , using electrodes of 70:30 cast brass]. After washing, the specimen is Au-plated (bath: AuCl_3 3, NaCN 3, Na phosphate 1.5, NaHSO_4 1.5 g. in 1 litre of H_2O , at 60°; 2.5 volts; Au anode).

H. J. E.

Protecting pressure vessels.—See I. **Stainless steels in textile industry.**—See VI. **Enamelling cast Fe.**—See VIII. **Hammer scale as pigment.**—See XIII.

See also A., June, 687, **Electromagnetic cores. Magnetic properties of alloys.** 689, **Thermoelectric effect of Pd-Ag. Superconducting alloys.** 692, **Effect of cold-work on thermal conductivity [of metals]. Diffusion of gases through metals.** 693, **Systems Au-Cu, Cu-Ag, Fe-Al, Al-Zn, Bi-Cd, K-Rb, Si-Al, Fe-cementite. Texture of rolled α -brass. α -Sn-bronzes.** 697, **Surface friction and adsorption of metals.** 704, **Oxidising power of basic slags.** 711, **Electrodeposition of Nb and Ta.** Gd. 715, **Prep. of pure V.** 716, **Reduction of Fe_2O_3 by H_2 .** 718, **Determining Se and detecting Te.** 719, **Determining small amounts of Ag.** 721, **Determining Co. Action of H_2SO_4 on Pt-Au-Ag alloys.** 723, **Alloy for Ra beam therapy.**

PATENTS.

Agglomerating, binding, and sintering process.

A. J. CADDICK (B.P. 427,567, 1.12.33).—Blast-furnace flue dust (A), mixed with ore dust if desired, is sintered by contact with any suitable molten slag (B), one method being to tip B over a heap of A .

B. M. V.

Annealing or other heat-treating chambers.

J. P. D. COLEMAN, and WILD-BARFIELD ELECTRIC FURNACES, LTD. (B.P. 427,964, 28.10.33).—An annealing pot having a liquid-sealed lid is provided with air channels surrounding the seal to prevent excessive access of heat to it.

B. M. V.

Case-hardening [of ferrous articles]. J. J. EGAN, ASSR. to ELECTRO METALLURG. CO. (U.S.P. 1,954,407, 10.4.34. Appl., 11.8.31).—The articles are heated in carbonaceous gases or vapours while a sparking plug or other ionising electric-discharge device is operated in close proximity to the surface to be carburised.

A. R. P.

(A) **Manufacture of rustless iron.** (B) **Production of [iron] alloys.** W. B. ARNESS, ASSR. to ALLOY RES. CORP. (U.S.P. 1,954,400 and 1,954,555, 10.4.34. Appl., [A] 24.8.32, [B] 15.8.31).—(A) A charge of rustless Fe scrap, roll scale, and chromite (C) is melted in an arc furnace (A) to produce a metal bath (B) and a $\text{FeO}-\text{Cr}_2\text{O}_3$ slag from which Fe and Cr are reduced into B by addition of 80% ferrosilicon (F) and CaO . (B) Fe or steel low in C is melted in A and a mixture of C and F is charged on the surface to introduce Cr into B and form a thick slag (S) through which further quantities of scrap are melted into B so that the metal trickling through S removes therefrom any suspended particles of Fe-Cr alloy.

A. R. P.

Production of composite [ferrous] metal castings. AGA HEAT, LTD. FROM BJORNEBORG JERNVERKS AKTIEBOLAG (B.P. 426,258, 15.12.34).—In making composite castings of cast Fe and 20—40% Cr-Fe alloys

metal inserts (I) are placed in the mould at the spot where the joint is to be made and the mould is then filled to part of the way up these (I) with one metal and the second metal then poured on top. The cooling effect of (I) prevents mixing of the two metals while still molten. A. R. P.

Case-hardening of iron or steel. MOSS GEAR CO., LTD., W. DUCKITT, and F. H. GOODE (B.P. 425,724, 25.4.34).—The articles are coated with a paste of pulverised coal 10, NaOH 1, BaCO₃ 1, and H₂O 12 pts. and are heated in a closed muffle at 900°. A. R. P.

Production of anticorrosive coatings [on iron and steel]. K. E. H. RODWELL (B.P. 425,848, 12.12.33).—The metal, *e.g.*, steel structures for immersion in sea-H₂O, is given a priming coat of cement and, when this is just dry, but before setting is complete, a coating of tar thinned with kerosene is applied and finally a 5 : 1 : 2 (by vol.) mixture of tar, kerosene, and Portland cement. A. R. P.

Coating of ferrous metals with a corrosion-resisting alloy. SOC. VALLOUREC (B.P. 425,717, 6.1.34, Fr., 3.2.33).—Fe or steel is first galvanised by dipping in molten Zn, and then coated with an Al bronze (B) by dipping in the molten alloy. For soft Thomas steel B contains Cu 88.9, Al 5, Ni 5, Mn 1, and P 0.1%, and for hard open-hearth steel Cu 82.9, Al 10, Ni 5, Mn 2, and P 0.1%. A. R. P.

Copper-base alloys. A. H. STEVENS. FROM AMER. BRASS CO. (B.P. 425,709, 2.11.33).—Strong, hard, and tough alloys of Cu contain Si 0.1–2.5 (0.5–1.5) and Mn 0.01–0.4 (0.25)%. A. R. P.

Alloy of copper and zinc [for condenser tubes]. E. POTTER. FROM OSNABRUCKER KUPFER U. DRAHTWERK A.-G. (B.P. 425,641, 23.1.34).—The alloy contains Cu < 70, Zn > 29, Al 1, and Cr 0.2–2%. A. R. P.

Etching [of intaglio cylinders]. A. H. STEVENS. FROM SHELLMAR PRODUCTS CO. (B.P. 425,630, 30.10.33).—The rate of etching by the usual acids is controlled by cooling the solution to > 5° by addition of CO₂ snow. A. R. P.

[Points for tipping] gold pens. W. C. HERAEUS GES.M.B.H. (B.P. 426,251, 18.10.34, Ger., 11.11.33).—The pieces of hard alloy used for tipping Au nibs are coated with Pd, Pt, or Rh to render them more readily attachable to the nib by fusion-welding. A. R. P.

Heat-resisting [aluminium–nickel] alloys. H. W. BROWNSDON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 425,614, 15.9.33).—An alloy of Ni 80 and Al 20% is resistant to scaling at > 1200°; it may be used for castings and for coating other metals by the hot-dipping and spraying processes. A. R. P.

Solution for treating [pickling] metal surfaces. O. L., H. L., and C. E. PETERSON, ASSTS. to DELANEY CHEM. CO. (U.S.P. 1,954,745, 10.4.34, Appl., 7.6.32).—Claim is made for a solution containing Na₂SO₄ (8), H₂C₂O₄ (10), and a sulphonated coal-tar distillate (0.5%). A. R. P.

Recovering metals and metalloids from their oxide, silicate, and carbonate compounds. K. MITTERBILLER-EPP (B.P. 425,835, 20.9.33).—The material is heated at 300–1000° with C and a halide of the

contained metal, whereby a volatile lower halide is stated to be formed which dissociates into metal and the usual halide at 700–1500°; *e.g.*, SiO₂, C, and SiCl₄ are stated to give Si₂Cl₆ at 400°, and the latter to give SiCl₄ and Si at 900°. A. R. P.

Manufacture of cores for foundry moulds and bonding agents therefor. W. M. LORD (B.P. 426,077, 3.1.34).—The sand is mixed with a bonding agent comprising an emulsion of a drying oil in dil. aq. Na₂SiO₃ containing an adhesive, *e.g.*, starch or dextrin, a soap, and a preservative. A. R. P.

Electrical reduction of ores. T. VARNEY (U.S.P. 1,954,900, 17.4.34, Appl., 11.10.33).—A mixture of ore and C is passed through elongated electrodes (E) between which an arc is passed to vaporise the charge, and the vapours are drawn out of the space between the E by a magnetic field in phase with the current supply. A. R. P.

Electrochemical removal of scale and oxide from the surface of stainless steel. T. E. DUNN, ASSR. to BULLARD CO. (U.S.P. 1,954,473, 10.4.34, Appl., 28.7.32).—The steel is anodically pickled in a solution containing Na₃PO₄, NaOH, Na₂CO₃, and dissolved PbO₂ or SnO₂, which assists in loosening the scale by oxidising the Cr₂O₃ in it. A. R. P.

Anodes for electrolytic cells for production of aluminium. MONTECATINI SOC. GEN. PER L'IND. MINERARIA ED AGRICOLA (B.P. 426,110, 21.7.34, It., 22.7.33).—The anodes are made up of a bundle of graphite blocks (B), the individual B being inserted at various heights in such a way as easily to mortise one on the other when inserting new B as the old are consumed. A. R. P.

Aërating cyanide solutions. H₂ for bright annealing.—See VII. Refractory bricks.—See VIII. Electrolytic condensers. Protecting pipes etc.—See XI. Zn-powder paint.—See XIII.

XI.—ELECTROTECHNICS.

Behaviour of alkaline accumulators at low temperatures. E. SCHMIDT and W. PIENING (Elektrotechn. Z., 1934, 55, 878–881; Chem. Zentr., 1934, ii, 3415).—Ni–Cd accumulators showed a large decrease in the discharge capacity at –22.5°. This is not observed on increasing [KOH] to 31%. H. J. E.

Behaviour of dielectrics under alternating stress. G. M. L. SOMMERMAN (J. Franklin Inst., 1935, 219, 433–458).—To find the cause of maxima in the power factor (I)–frequency and (I)–temp. curves of dielectrics, (I) was determined over a frequency range of (65–7.2) × 10⁶ cycles per sec., and from 2.9° to 90°, for a non-polar substance (a mixture of two paraffins, m.p. 68–72° and 40–42°, respectively), and for mixtures of this with a polar substance (PhOH or stearic acid). Short-time, d.-c. investigations were also made with the same substances and over the same ranges. The mixture of paraffins alone shows small maxima which vary in position over audio-frequencies as the temp. is varied. Introduction of 3% of PhOH gives rise to maxima occurring above 10⁷ cycles per sec. Lowering of temp. does not greatly alter the positions of these maxima, but

considerably broadens them. They are due to orientation of the polar mols. The addition of 10% of stearic acid gives similar effects. Maxima in (I) due to ionic polarisation, or inhomogeneity in the amorphous and solid states, are < 60 cycles per sec., and the effect is \propto the concn. of the ions. These two types of maxima are not greatly shifted by temp. because the inner viscosity does not alter greatly with temp. A third type of max. due to orientation of associated polar aggregates occurs between audio- and radio-frequencies, and varies in position with temp. A. J. M.

Uranium dioxide equalising resistances. G. W. MÜLLER (A.E.G.-Mitt., 1934, 267—270; Chem. Zentr., 1934, ii, 3538).—A discussion of the technical application of the negative temp. coeff. of resistance of UO_2 in switch gear, relays, etc. H. J. E.

Conductivity of molten glasses.—See VIII. **Weld metal. Ni-plating. Galvanos. Mg. Gilding Al.**—See X. **Measuring colour of leather.**—See XV.

See also A., June, 687, **Electromagnetic cores. Magnetic properties [of alloys].** 689, **Thermoelectric effect of Pd-Ag. Superconducting alloys.** 707, **H overvoltage [in electrolysis of H_2SO_4].** 709, **Electrochemical chlorination of C_6H_6 .** 711, **Electrodeposition of Nb and Ta.** Gd. 712, **Oxidation of SO_2 in arc discharge.** 714, **Production of MgCl_2 and $\text{Mg}(\text{ClO}_3)_2$.** 717, **Determination of SO_3 .** 721, **Action of H_2SO_4 on Pt-Au-Ag alloys. Photoelectric temp. regulator. Production of low temp.** 723, **Alloy for Ra beam therapy. Production of heavy H_2O .**

PATENTS.

Apparatus for acting on chemical compounds [by silent electric discharge]. V. T. MALCOLM, Assr. to CHAPMAN VALVE MANUFG. CO. (U.S.P. 1,975,063, 25.9.34. Appl., 28.9.33).—The discharge takes place between a star-shaped electrode and a ring. B. M. V.

Glow cathode. W. ESPE and F. EVERS (U.S.P. 1,954,474, 10.4.34. Appl., 30.8.28. Ger., 20.5.27).—Claim is made for a W filament surrounded by SiO_2 gel impregnated with an alkali metal, e.g., K. A. R. P.

Manufacture of photoelectric electrodes. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 428,680, 16.2.35. Ger., 8.3.34).—The whole of the photoelectric metal introduced into an electron-discharge tube is used up to form the photoelectric electrode. J. S. G. T.

Galvanic cell and caustic electrolyte therefor. G. W. HEISE and C. W. BROKATE, Assrs. to NAT. CARBON CO., INC. (U.S.P. 1,954,410, 10.4.34. Appl., 13.5.30).—Claim is made for a cell of the Lalande type containing a Zn anode and Cu cathode in 25% aq. NaOH which contains a small amount of casein, saponin, glue, albumin, resin, lignin, or tannin, e.g., which has been in contact with wood chips for 1 week or has been boiled with them for 2 hr. A. R. P.

Electrolytic condensers [made of aluminium foil]. ELEKTRIZITÄTS-A.-G. HYDRAWERK (B.P. 425,738, 4.7.34. Ger., 5.7.33).—Mechanical details are claimed. A. R. P.

Electrolytic condensers. P. A. SPORING, C. D. GWINN, and TELEGRAPH CONDENSER CO., LTD. (B.P.

428,679, 8.2.35).—Liquid electrolyte has access to both sides of the surface of a hollow anode (A), e.g., of Al, surrounded by a cathode, e.g., of Al coated with Cr, and the outer surface only of A is embossed or fluted in order to increase its surface. J. S. G. T.

Electric current rectifier. E. RUPP, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,955,564, 17.4.34. Appl., 11.10.32. Ger., 14.10.31).—A W sheet is heated at 900° in $\text{CO}_2 + \text{N}_2$ to produce a thin layer of blue W_2O_5 on the surface, quenched, and coated on one side with Pb. A. R. P.

Resistance-varying material. F. S. GOUCHER and C. J. CHRISTENSEN, Assrs. to BELL TELEPHONE LABS., INC. (U.S.P. 1,973,703, 18.9.34. Appl., 11.11.31).—Granules for microphones are composed of refractory material coated uniformly and thinly with pure C, produced by the thermal decomp. of a flowing mixture of C-yielding gas (CH_4) and a neutral gas (N_2). The conditions for obtaining max. modulating efficiency are discussed and graphs given. B. M. V.

Protective coatings and sheathings for cables, pipes, and the like. ENFIELD CABLE WORKS, LTD., E. BOWDEN, and D. O'DUFFY (B.P. 425,906, 20.9.33).—Claim is made for cable sheathings etc. built up of alternate layers of rubber (R) and a fibrous material impregnated with an oily-bituminous mixture which exerts a solvent action on (R) and converts it into a jelly-like mass of high resistance to H_2O -penetration. A. R. P.

H_2O -softening apparatus. Boiler scale. Hot- H_2O plant.—See I. **Cable insulation.**—See V. **Case-hardening Fe. Ore reduction. Scale removal from steel. Al.**—See X. **Rubber insulation.**—See XIV. **Density determination.**—See XXI.

XII.—FATS; OILS; WAXES.

Kingzett's iodometric method for determination of perborate in soap powder. J. R. N. VAN KREGTEN (Chem. Weekblad, 1935, 32, 317).—Acidified perborates (and free H_2O_2) react but slowly with KI, and the 5 min. normally allowed is insufficient. Reaction is immediate if a few drops of 3% aq. $(\text{NH}_4)_2\text{MoO}_4$ or Na_2MoO_4 are added as catalyst. D. R. D.

[Glycerin analysis.] **Report of the Glycerin Analysis Committee, Soap Section, American Oil Chemists' Society.** J. T. R. ANDREWS (Oil and Soap, 1935, 12, 90—91).—The international standard acetin method is slightly improved by performing the neutralisation after acetylation as rapidly as possible with the solution in an ice-bath. G. H. C.

Extraction of oil from maize germs by pressing and by extraction. R. HEUBLUM (Seifensieder-Ztg., 1934, 61, 638—640; Chem. Zentr., 1934, ii, 3453).—Various processes are discussed, the best being warm pressing and extraction with warm petroleum (b.p. $70-80^\circ$). The properties of the oils so obtained are compared. The product must be refined, otherwise it rapidly becomes rancid. H. N. R.

Composition of American tung oil. R. S. MCKINNEY and G. S. JAMIESON (Oil and Soap, 1935, 12,

92—93).—Hanus I vals. were corr. for substitution by a separate determination of HBr formed (as AgBr). From these, with SCN vals. and the saturated acids as determined by Bertram's method, tung oil fatty acids are shown to contain 0.8% of oleic acid. This is confirmed by the amount of dihydroxystearic acid recovered from the oxidation products. G. H. C.

Chemistry of linseed stand oil and thickening of zinc white-linseed stand oil mixtures. H. KURZ (Angew. Chem., 1935, 48, 304—306).—The views of earlier workers on the changes occurring when linseed oil is heat-thickened are summarised and critically examined. It is considered that the colloid-chemical nature of linseed stand oil (I) is by no means established. A sample of (I) (η_{20} 75, acid val. 17.5, d 0.9663) was extracted with COMe_2 , giving 27% of COMe_2 -sol. (η_{20} 4.7, acid val. 38.2, d 0.9495) and 73% of COMe_2 -insol. (η_{20} 213, acid val. 9.2, d 0.9720) fractions. The original (I) and the fractions were further examined after progressive removal of free acids by treatment with appropriate amounts of KOH, and it is established that η is dependent on free acid content. Thus the original (I) gave rise to an oil of acid val. 0 and η_{20} 1763. Arguments that this evidences colloidal behaviour (peptisation etc.) are rejected. The thickening of ZnO-(I) mixtures is considered to be due to removal of free acid by the ZnO, either by chemical combination or adsorption, with consequent rise in η . The known usage of (I) of high acid val. in enamel-manufacturing practice accords with these views, whereas "colloidal theory explanations" fail. S. S. W.

Polymerisation of fatty oils. VII. Polymerisation of ethyl linolenate. VIII. Hydrogenation of polymerised linseed and wood oils. A. STEGER and J. VAN LOON (Rec. trav. chim., 1935, 54, 428—433, 433—442; cf. B., 1935, 559).—VII. Et linolenate (I) in CO_2 at 300° gives low-boiling decomp. products of (I) and "slightly polymerised" products, not simply related to (I), but probably cyclic.

VIII. Hydrogenation (Ni-kieselguhr; 180°) of polymerised linseed oil slowly gives a product with low SCN and moderate I val., of which 45.5% is destroyed by KMnO_4 and is thus "unsaturated." The saturated acids produced by oxidation include stearic and a liquid acid of similar constitution. Polymerised wood oil gives similar results. "Polymerisation," therefore, consists of a chemical, rather than a physical, change. R. S. C.

Caprified fig-seed oil. G. S. JAMIESON and R. S. MCKINNEY (Oil and Soap, 1935, 12, 88).—The cold-expressed oil was bright yellow, did not solidify at 10°, and gave: n_D^{25} 1.4775, I val. 169.4, acid val. 0.87, Ac val. 6.1, unsaponifiable 1.07%; the fatty acids contained oleic, linoleic, linolenic, palmitic, stearic, and arachidic acids. G. H. C.

Henbane-seed oil. C. LUTENBERG and S. IVANOV (Allgem. Oel- u. Fett-Ztg., 1935, 32, 189—194).—The oil content of seeds of *Hyoscyamus niger* from Trubtschevsk (extracted with light petroleum) increased from 10.3% (7—10 days after flowering) to 28.9% when fully ripe, the oils having I val. 135.8 and 142.9 and SCN vals. 78.9 and 81.1, respectively. Further figures for the

oil from ripe seeds are: n_D^{20} 1.4693, acid val. 11.95, sap. val. 186.7, unsaponifiable matter 1.99%, saturated acids 7.2% (Bertram's method; having m.p. 50.9°, acid val. 193.2). The fatty acids (I val. 148.2, SCN val. 85.2) included oleic and linoleic acid, but no linolenic acid. Films of the raw oil and of the oil after heating at 280° for 25 min. dried in 8 and 3 days, respectively. E. L.

Characteristics of sandalwood seeds and seed oil (Mysore). Y. V. S. IYER (Analyst, 1935, 60, 319—320).—The % of N and oil (I) of 6 samples of seeds, and the n , d , and the sap., I, Ac, and acid vals. of (I), are given. The mixed fatty acids of (I) had: mol. equiv. 285, I val. 102, titre test 35°. The solid fatty acids had a mol. equiv. 278 and I val. 10.5. E. C. S.

Static interfacial tension as a function of the concentration of alkali in the saponification of an oil. J. WAJZER (Compt. rend., 1935, 200, 1148—1150).—The σ —($-\log [\text{NaOH}]$) curve for the saponification of arachis oil (I) is shifted to the right by addition of $\geq 1\%$ of oleic acid (II), further additions causing a return towards the left. With 1% of (II), the curve shows levels at σ 20 and 12.8 dynes/cm., corresponding to σ between (I) and (II), respectively, and H_2O . After saponification of (I) is complete, σ falls sharply to 4 dynes/cm. through superficial neutralisation of (II), and then decreases steadily to zero, the curve being linear; calc. vals. are given for the concn. of the Gibbs layer for this section. R. N. C.

Oxidation of unsaturated fatty oils by atmospheric oxygen. J. M. AAS (Fettchem. Umschau, 1935, 42, 71—75).—The fall in I val. (F) and increase in wt. (W) have been tabulated for a large no. of different oils exposed to the air in the dark or in diffused light. In order to eliminate the time factor, which, owing to small differences in the conditions of parallel experiments, hinders comparison in the case of the ordinary change/time curves, F has been plotted against W ; such graphs are straight lines over the autoxidation period (P), which terminates after about 40—60% saturation of the double linkings in the case of animal oils (A), and at 15—50% saturation for vegetable oils (V). Neglecting volatile products of oxidation, and taking W as = O_2 absorption, A show an average absorption of 2.0 and V of 1—4.0 per double linking. After the P , decomp. reactions set in, which repress any further W . E. L.

Storage of cod-liver oil. B. ZAMOYSKA (Wiad. farm., 1933, 60, 379—381; Chem. Zentr., 1934, ii, 3789).—The vitamin-A content of the oil was destroyed by heating at 100° for 15 min., or on a H_2O -bath for 3 hr. Exposure to bright daylight for 14 days resulted in a 50% loss of -A. Oil stored in darkness (cold) lost its -A after 1 year. A. G. P.

Shark-liver oil. W. S. JONES and W. G. CHRISTIANSEN (J. Amer. Pharm. Assoc., 1935, 24, 295—296).—Commercial preps. of shark-liver oil (I) gave low vals. for vitamin-A, whilst freshly prepared samples gave 2200—2700 U.S.P. units; the content of vitamin-D was only 14 Steenbock units. H. D.

Sulphonated oils. XXII. Form of organically combined sulphuric acid in the sulphonated oils. K. WINOKUTI and T. IIDA. XXIII. Reaction between castor oil and concentrated sulphuric acid. K. WINOKUTI, T. IIDA, and M. KURATA. XXIV. Reaction between olive oil and concentrated sulphuric acid. K. WINOKUTI and M. KURATA (*J. Soc. Chem. Ind., Japan*, 1935, 38, 25—27 B, 27—31 B, 31—32 B; cf. B., 1934, 970).—XXII. In most cases (except when conc. H_2SO_4 alone is used), when castor oil is treated with ClSO_3H , fuming H_2SO_4 , or conc. H_2SO_4 , with/without dehydrating catalysts, diluents, etc., a certain amount of an acid product can be separated which is insol. in Et_2O and not decomposable by boiling HCl (distinction from H_2SO_4 esters); it has the properties of a true sulphonic acid ($\text{CO}_2\text{H}\cdot\text{R}\cdot\text{SO}_3\text{H}$).

XXIII. By following the changes in strong and weak (CO_2H) acidity during the treatment of castor oil with conc. H_2SO_4 at moderate temp., it has been shown that the sulphation reaction (resultant of $\text{R} + \text{H}_2\text{SO}_4 \rightleftharpoons \text{RO}\cdot\text{SO}_3\text{H}$) proceeds much faster than the hydrolysis of the glycerides, particularly when low temp. and a high $[\text{H}_2\text{SO}_4]$ are employed. This has been confirmed by the determination of glycerol in the sulphated product. The curves for strong acidity show characteristic minima indicating conditions of time, temp., and $[\text{H}_2\text{SO}_4]$ favouring the max. combination of H_2SO_4 . The I val. of the oil may fall by 50% during the reaction, indicating an appreciable absorption of H_2SO_4 at the unsaturated linkings.

XXIV. Sulphation and hydrolysis are both more rapid than in the case of castor oil. Sulphation being a reversible reaction, greater nett combination of H_2SO_4 is achieved when a high $[\text{H}_2\text{SO}_4]$ and low temp. are employed; if the reaction mixture becomes too viscous, a suitable diluent (solvent) should be added in order to facilitate agitation. E. L.

Fish oils. W. ALEXANDER (*Oil and Soap*, 1935, 12, 89—90).—A review of the manufacture and applications is given. G. H. C.

Basking shark-liver oil. New hydrocarbon in basking shark-liver oil. M. TSUJIMOTO (*Bull. Chem. Soc. Japan*, 1935, 10, 144—148, 149—153).—The characteristics of the oil and its constituent fatty acids and unsaponifiable content are given. Distillation of the oil yields impure pristane (I), b.p. 144—154°/5 mm., and squalene, b.p. 180—247°/5 mm. An impure octadecylene (II), b.p. 175—185°/12 mm. (0.2% yield), is obtained by bromination of (I) followed by removal of pristane by distillation and debromination (Zn and $\text{HCl}\text{--}\text{MeOH}$) of the undistillable residue. The name "zamene" is proposed for (II). F. N. W.

Determination of active ingredients and total fatty matter in sulphonated and sulphated oils. R. HART (*Ind. Eng. Chem. [Anal.]*, 1935, 7, 137—140).—The Wizöff and Herbig methods for determining total fatty acids give low results which, in the latter case, depend on the method of decomp. A method involving Et_2O extraction of the "total active ingredients" is described and is applicable to mineral oils which are not decomposed by acids. J. L. D.

Corrosion of silumin.—See X. **Contact insecticides.**—See XVI. **Ghee.**—See XIX.

See also A., June, 701, **Flow velocity of resin soaps**. 709, **Velocity of saponification of simple triglycerides**. 746, **Condensation of 2:6-dimethylol-*p*-cresol with esters of higher fatty acids**. 772, **Fatty substances of shellfish**. 792—4, **Vitamins**.

PATENTS.

Detergents. [Toilet soaps.] R. BUSHBY (B.P. 424,977, 4.9.33).—A soap (H_2O -sol.) is added (80—90°) to a mixture of a non-saponifiable oil (liquid or jellied paraffin) and an emulsifying agent $[\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3]$ salt of higher fatty acid] at 90°; perfume may be added.

A. W. B.

Manufacture of non-toxic germicidal detergent or cosmetic [soap] compositions. LEVER BROS., LTD. (B.P. 427,324, 19.10.33. U.S., 19.10.32 and 3.8.33).—Aromatic Hg^{II} salts, wherein none of the nuclear C atoms is directly linked with any element other than C, H, and Hg, and the other linking of the Hg atom is directly united to the acidic group of an acid radical, e.g., Hg Ph nitrate, glycollate, acetate, benzoate, ricinoleate, azelate, saccharate, or arsanilate, are added, in proportions of 0.1—0.5%, to soaps, including salts of rosin acids and of acids obtained by oxidation of petroleum hydrocarbons, and higher fatty sulphates or sulphonates such as "Gardinol" or "Igepon."

A. W. B.

Dry powdered soap composition. L. H. PHILLIPS (U.S.P. 1,972,458, 4.9.34. Appl., 21.3.32).—A dry powder (adapted to yield a homogeneous paste when mixed with H_2O for use) consists of an intimate mixture of soap powder (2 pts.) with sawdust (1 pt.) which has been thinly coated with vegetable oil (e.g., a 1:1 mixture of cottonseed and sassafras oils) and small amounts of alkali (NaOH) and a neutralising agent, e.g., powdered rosin. E. L.

[Paste] soap. L. F. HOYT, Assr. to LARKIN CO., INC. (U.S.P. 1,971,375, 28.8.34. Appl., 9.1.32).—A paste toilet soap consisting of 10—50% of an alkylol amine soap (e.g., from ethanolamine and olive or coconut oil fatty acids), 15—60% of a potash soap of soft fats, and only 10—35% of H_2O , retains its consistency over the temp. range 0—100° and lathers well in fresh or sea- H_2O . E. L.

Detergents, wetting agents, etc. Aq. liquids for textiles etc.—See III. **Flotation of phosphates.**—See VII.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Iron hammer-scale as a rust-protecting pigment. A. SCHNEIDER (*Z. Ver. deuts. Ing.*, 1934, 78, 1001—1002; *Chem. Zentr.*, 1934, ii, 3551).—The material is very suitable. The cryst., C-free, light scale is very readily coloured. The Pb-soap skin of hammer-scale red lead (I) is harder and tougher than that of ordinary (I). Data for various oil-protection pigments are recorded. H. J. E.

Brazilian copal. F. TROST (*Boll. Soc. adriat. Sci. Nat. Trieste*, 1932, 31, 31—35; 1934, 32, 43—68; *Chem. Zentr.*, 1934, ii, 3851—3852).—From the Et_2O

solution (I) of Brazilian copal a mixture of amorphous acids was extracted with 1% Na_2CO_3 pptd. with dil. AcOH , and treated in EtOH solution with an EtOH-Pb(OAc)_2 solution. The Pb salts sol. and insol. in EtOH gave 2 acids (or acid mixtures) which are described (yields 0.6, 35%, respectively). (I), after treatment with Na_2CO_3 , gave on treatment with 1% KOH a resin of m.p. $126-128^\circ$ (yield 25%). The residual Et_2O -sol. material gave an oil on steam-distillation (yield 1.5%). The residue was a resin. The changes on heating copal at $50-300^\circ$ were studied. After heating to $>150^\circ$ the solubility in light petroleum increases and that in EtOH falls. The change on melting copal (at approx. 200°) is mainly one of decarboxylation. In the acids extracted with $(\text{NH}_4)_2\text{CO}_3$ the O is combined partly as CO_2H , partly as OH , and partly in an unknown form. Dehydrogenation of the acids with Se gives $1:2:5\text{-C}_{10}\text{H}_5\text{Me}_3$. On heating the acids to $190-290^\circ$ they lose CO_2 , H_2O , and H_2 . H. J. E.

[Vinyl] polymerides as lacquer bases. F. OHL (Farbe u. Lack, 195—196, 206—207, 221, 231—232).—A review is given of the prep., application, properties, and analysis of lacquers made with vinyl and acrylic ester polymerides. Exposure has very slow action on their marked freedom from colour and resistance to light; measured transparencies are tabulated after 2, 4, and 6 months' exposure, together with those of cellulose ester (I) films. They are also resistant to benzol, mineral oils, Cl_2 , H_2S , and acids. Their tendency to absorb H_2O and consequent swelling can be reduced by stoving or incorporating suitable solvents, plasticisers, or pigments (II). Products having low η are less resistant to heat; usually they withstand a temp. of 180° . The drying time is $>$ with a (I), but is reduced by (II). Plasticisers used for nitrocellulose (III) are efficient, e.g., Bu_2 phthalate. They are not usually compatible with other resins, fatty oils, cellulose acetate or ethers, but low- η (III) can be added with advantage. Both basic and metallic (II) can be incorporated with neutral products. S. M.

Plastics in a chemical works. M. B. DONALD (Chem. & Ind., 1935, 540—546).—A lecture.

Grain size of mineral colours.—See I. Solubilities of cellulose derivatives.—See V. Doped fabric.—See VI. Corrosion of ships' hulls.—See X. Thickening of Zn-white-linseed stand oil.—See XII. Jalap resin.—See XX.

See also A., June, 746, Condensation of 2:6-dimethylol-p-cresol with esters of higher fatty acids. 754, Amber.

PATENTS.

Mixing of paint or the like. U. WEDGE (U.S.P. 1,973,274, 11.9.34. Appl., 29.7.30).—The vehicle is lifted from a pool by a rotor consisting of, e.g., spaced discs, and the pigment is blown on to the films by a circulating body of air. B. M. V.

Metallic [zinc-powder] paint. U. C. TAINTON (U.S.P. 1,954,462, 10.4.34. Appl., 29.5.32).—Thin sheets of bright Zn foil are ground in light petroleum in a ball mill the discharge from which is passed through a classifier to remove the coarser particles and then

passed to settlers and filters. The filter cake is re-ground with linseed oil containing a small amount of a fatty acid, e.g., stearic or oleic, which dissolves any ZnO produced during grinding. A. R. P.

[Plasticisers for] products containing derivatives of cellulose. CELLULOID CORP. (B.P. 428,160, 24.4.34. U.S., 26.4.33).—The use is claimed of monomeric esters of di- or poly-olefine glycols with ≤ 1 hydroxycarboxylic acid, e.g., lactic, tartaric, or derivative thereof. S. M.

Cellulose organic ester composition containing an ester of maleic acid. H. B. SMITH, Assr. to EASTMAN KODAK CO. (U.S.P. 1,969,482, 7.8.34. Appl., 23.12.32).—The Et ethers of mono- and di-ethylene glycol maleate and dibenzyl maleate (preps. described) are used to plasticise cellulose acetate etc. S. M.

Nitrocellulose cement. A. C. RITTMAN, Assr. to EASTMAN KODAK CO. (U.S.P. 1,969,477, 7.8.34. Appl., 16.5.32).—A typical cement comprises 4.5 pts. of nitrocellulose (I), 1 pt. of plasticiser, e.g., camphor, and 100 pts. of a liquid mixture of solvents for (I) (40%), org. non-solvents for (I) (55%), and a tolerable amount of H_2O (5%). The products are suitable for attaching (I) sheets to paper or cardboard. S. S. W.

Siccative composition. H. A. BRUNSON and O. STEIN, Assrs. to RESINOUS PRODUCTS & CHEM. CO. (U.S.P. 1,969,709, 7.8.34. Appl., 13.12.32).—Multivalent and heavy-metal (Pb, Co, Mn) salts of acids having the formula $\text{RO-C}_n\text{H}_{2n}\text{-CO}_2\text{H}$ (R = alkyl above C_3 , or a hydroaromatic or aralkyl radical), e.g., butyl- or cyclohexyl-oxybutyric acid, are used to accelerate the oxidation of drying oils, alkyd resins, etc. They are sol. in petroleum naphtha and possess pale colour; other properties and preps. are described. S. M.

Preparation of waterproofing and tanning composition [rubber substitute]. F. BERDOLT, Assr. to M. E. BERDOLT (U.S.P. 1,969,701, 7.8.34. Appl., 7.3.32).—S is boiled in aq. suspension until its colour darkens and is then incorporated with linseed oil (I) to give a rubber substitute; with more (I) a waterproofing composition is obtained. S. M.

Polymerised halogenated hydrocarbon. Solvents. Emulsions. Org. ethers.—See III. Cellulose compositions. Transparent coatings. Metallised cellulose.—See V. Colouring plastics. Transfer.—See VI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Heats of reaction of the system rubber-sulphur. A. T. MCPHERSON and N. BEKKEDAHL (Ind. Eng. Chem., 1935, 27, 597—602).—The heat of reaction of pale crêpe or purified rubber and S at 175° was measured in an insulated Cu cylinder mounted in a Dewar flask which itself was surrounded by thermal insulation and situated in a container, the hollow walls of which were maintained at 175° by the vapours of boiling cymene. The heat required to correct for the different temp. of the rubber-S mixture when this was introduced was supplied electrically. The heat generated in vulcanisation was measured by the introduction of steel balls at such a rate as to keep the temp. const. The results show a marked change in the direction of the curve

plotting the heat liberated against the % of S used, the break occurring at 0.5 atom of S per C_5H_8 .

D. F. T.

Dispersion of channel gas black in rubber. Effect of stearic acid and other so-called dispersing agents. C. R. PARK and V. N. MORRIS (Ind. Eng. Chem., 1935, 27, 582—586).—Microscopical examination shows that C black is dispersed with difficulty in rubber in which the $COMe_2$ -sol. matter has been reduced to $> 0.5\%$. The addition of stearic acid to the rubber markedly improves the dispersion of the C. By using $COMe_2$ -extracted rubber it is possible to compare the effectiveness of various agents on the ease of dispersion of the C. Several other materials, *e.g.*, pine tar, also facilitate the dispersion, but none is so effective as stearic acid; some, *e.g.*, paraffin wax, actually appear to impair the dispersion. Little relation exists between the dispersive action of any particular agent for channel gas black in rubber and its deflocculating effect on a paste of the black in dipentene.

D. F. T.

Modified rubbers. VI. Oxidation of rubber solutions with gaseous oxygen in presence of catalysts. G. F. BLOOMFIELD and E. H. FARMER (J.S.C.I., 1935, 54, 125—133 T; cf. A., 1934, 896).—Although Co linoleate is the most powerful catalyst for the action of O_2 on dissolved rubber, in the additional presence of MeCHO Co oleate is more effective than the linoleate. At 40° in C_6H_6 Co compounds show the following order of activity: oleate $>$ linoleate $>$ hexoate $>$ hydroxide $>$ butyrate $>$ propionate $>$ acetate or nitrate; the order may be modified with the use of other solvents. The initial reduction in η involves little absorption of O_2 and is probably due to intermicellar breakdown promoted by O_2 traces. Rapid absorption follows with formation of CO_2 and H_2O , and when the ratio of absorbed gas is $C_{10}H_{16}$:O, a ppt. forms consisting largely of the catalyst but containing also a product $C_{10}H_{16}O_3$; at this stage the rubber still in solution is gum-like. The limit of oxidation observed was a brittle resin, $C_{10}H_{16}O_3$, the formation of which was accompanied by that of $2H_2O$ and $\frac{1}{2}CO_2$. Paraldehyde (or MeCHO) increases the activity of the Co catalysts, although not equally, and Ac_2O has a similar effect. Residual traces of the Co catalyst in the oxidised rubber can be removed by pptn. with thioglycolic acid.

D. F. T.

Colloidal changes during rubber vulcanisation. I. WILLIAMS (Ind. Eng. Chem., 1934, 26, 1190—1193).—Rubber which has been lightly vulcanised with S can be dissolved in C_6H_6 with the help of peptising agents; *e.g.*, the addition of additional piperidine pentamethylenedithiocarbamate (I) to a mixture of dissolved rubber, S, and (I), which has gelled by incipient vulcanisation, will restore it to a mobile fluid condition. Similarly, lightly vulcanised rubber can be rendered sol. in C_6H_6 by mastication with a little (I). Sol. Zn compounds, *e.g.*, $(EtCO_2)_2Zn$, cause a gelling action with great increase in tensile strength. Vulcanisation probably involves chemical action of rubber (R) and vulcanising agent (s) with formation of units Rs. These then break up into a larger no. of smaller units xR' which are more active both chemically and colloiddally, and a smaller unit R'' s; the val. of x and the magnitude of R'' are dependent on

the peptising action of the accelerator. In a third step, which is favoured by sol. Zn, the R' units combine to a no. of larger and more stable units $(x/n)R'n$.

D. F. T.

Theory of the elasticity of rubber. K. H. MEYER, C. FERRI, and W. HOHENEMSER (Kautschuk, 1935, 11, 88—95).—The X-ray interference diagrams for stretched unvulcanised rubber show an identity period of 8.1 \AA ., whereas that of β -gutta is 4.8 \AA .; contrary to other views, rubber must consequently represent the *cis*-modification. The length of the main-valency chain is also probably $< 800 \text{ \AA}$. or < 1000 C atoms. The "crystallisation" of rubber on stretching is closely related to the ordinary crystallisation of org. substances, and the magnitude of its heat effect (10 g.-cal./g.) agrees closely with the heat of fusion of many org. compounds. Comparison with the action of S on cyclohexene shows the probability that vulcanisation involves the formation of C-S-C linkings, which is confirmed by the fact that vulcanised rubber yields a solid additive compound with MeI; vulcanisation therefore results in the formation of S bridges between the fibre mols., the new and partial net-like structure explaining the physical features of the vulcanised material. Experimental and mathematical considerations indicate that the thermal vibration of the atoms is responsible for the natural tendency of stretched rubber to retract from the oriented anisotropic condition to the unoriented isotropic state.

D. F. T.

PATENTS.

Making of rubber articles [from latex]. M. E. HANSEN, Assr. to AMER. ANODE, INC. (U.S.P. 1,968,887, 7.8.34. Appl., 17.8.32).—An impervious former, heated at a temp. $<$ the b.p. of a solution of a coagulant in a volatile solvent (*e.g.*, $CaCl_2$ in EtOH) with which it is then to be coated by dipping, is subsequently immersed in a coagulable rubber dispersion. The resulting rubber deposit (*e.g.*, a glove) may then be dried and vulcanised.

D. F. T.

Forming of rubber articles [from latex]. S. R. OGILBY, Assr. to NAUGATUCK CHEM. CO. (U.S.P. 1,969,275, 7.8.34. Appl., 20.10.33).—A deposition form is coated with a porous rubber layer containing a latex coagulant, *e.g.*, by dipping into a naphtha solution of rubber to which an EtOH solution of hydrated Mg acetate has been added; on removal of the form from the mixture, the naphtha evaporates more rapidly and the EtOH, causes the coating to "set" to a non-fluid gel. On dipping a form so prepared into latex a rapid deposition of latex rubber is effected thereon, this deposit eventually becoming integral with the initial rubber layer.

D. F. T.

Preservation of rubber. E. I. DU PONT DE NEMOURS & Co., and A. M. NEAL (B.P. 428,146, 8.11.33).—A small % of β - $C_{10}H_7$ -NH- C_6H_4 -OEt (*p*) is incorporated.

D. F. T.

Rubber composition and its preservation. W. L. SEMON, Assr. to B. F. GOODRICH CO. (U.S.P. 1,968,914, 7.8.34. Appl., 22.5.33).—Rubber is treated with the additive product of a phenol containing < 2 discrete rings, *e.g.*, p - C_6H_4 Ph-OH or *pp'*-dihydroxydiphenyl-dimethylmethane, and an amine, *e.g.*, $NHBu_2$, $CH_2(C_6H_4NH_2)_2$, or $C_{10}H_7NHPh$.

D. F. T.

Rubber [insulation] composition. W. C. GEER, Assr. to B. F. GOODRICH Co. (U.S.P. 1,968,883, 7.8.34. Appl., 16.11.28).—Rubber with a low H_2O -absorption and suitable for electrical insulation is obtained by heating a mixture of natural rubber and an alkaline reagent, e.g., Na_2CO_3 , or Na oleate, in presence of H_2O and thereafter washing the product for the removal of H_2O -absorbing constituents and any excess reagent.

D. F. T.

Flexible oil-resistant rubber composition. IMPERIAL CHEM. INDUSTRIES, LTD., M. JONES, and W. F. SMITH (B.P. 428,052, 7.10.33).—In a vulcanisable rubber mixture is incorporated the C_6H_6 -sol., EtOH-insol. polymerisation product of $CH_2=CCl-CH=CH_2$ (cf. B.P. 387,363; B., 1933, 318) and additional S prior to vulcanisation.

D. F. T.

Preparation of rubber and road-tar mixtures. RUBBER PRODUCERS RES. ASSOC., G. MARTIN, W. S. DAVEY, and T. A. SHARPLEY (B.P. 428,100, 9.1.34).—Stable dispersions of rubber in (horizontal-retort) tar are obtained by dissolving "nitrite rubber" (5 pts.) (B.P. 395,774—5; B., 1933, 880) in a creosote fraction of the tar (75 pts.), adding the pitch from the tar, and heating. Used as a road-dressing, the product shows improved elasticity and reduced tendency to bleed.

D. F. T.

Production of chemical product [synthetic rubber]. A. M. COLLINS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,967,865, 24.7.34. Appl., 1.2.34).—Addition of oxidising agents ($K_2S_2O_8$, Bz_2O_2 , NH_4NO_3 , $NaBO_3$) before, during, or after polymerisation of latices of β -chloro- or -bromo-butadiene gives increased tensile strength and resistance to ageing, independent of the presence of other compounds, e.g., antioxidants.

A. W. B.

Polymerised halogenated hydrocarbon. Emulsions.—See III. **Rubber-bonded abrasives.**—See VIII. **Rubber substitute.**—See XIII.

XV.—LEATHER; GLUE.

Morphology of bacteria causing reddening of salted [raw] hides. L. S. STUART (J. Amer. Leather Chem. Assoc., 1935, 30, 226—235).—The flesh reddening of salted hides has been traced to *Myxococcus rubescens*, Thaxter, the morphology of which is affected by the available org. nutriment and the [NaCl] in the substrate. It produces H_2S from free S.

D. W.

Sulphiding without soaking. I. Dry hides. V. CASABURI and I. CRISCUOLO-CANTARELLA (Boll. Staz. Sperim. Ind. Pelli, 1935, 13, 111—117).—Dry hides may be treated with aq. Na_2S without presoaking, the yield of leather being thus increased and the quality improved. Results obtained with various antiseptics in the sulphide bath are given (cf. B., 1927, 948; 1928, 205). T. H. P.

Pickling [of skins]. VI. Effect of various pickles on chromium absorption during chrome-tanning. E. R. THEIS and E. J. SERFASS (J. Amer. Leather Chem. Assoc., 1935, 30, 235—247; cf. B., 1935, 563).—The swelling (S) of pelt during pickling (P) and chrome-tanning (T) progressively increased with the dilution of the pickle liquor (I). In all cases, the Cr-fixation (F) was retarded by NaCl. With const. [NaCl], S and F were only slightly increased with dilution of (I). Different

acids in (I) produced characteristic S curves. HCl and H_2SO_4 were almost completely, and H_3PO_4 was 66%, absorbed by pelt in P. The absorption of AcOH increased progressively with [NaCl], whereas the absorption of $H_2C_2O_4$ diminished. F after different (I) was as follows: $HCl < H_3PO_4 < H_2SO_4$, $H_2C_2O_4 < AcOH$. F was diminished by increasing the alum concn. in an alum-NaCl (I).

D. W.

Theory and practice of combination tannages. H. OWRUTSKY (Collegium, 1935, 178—180).—It is not clear whether in combination tannages (T) one tannage suppresses the other or whether the two combine with different groups in the collagen mol. It is shown that vegetable tannin and synthetic tannin in T are quite independent of each other. Pelt must not, however, be chromed too fully if a satisfactory chrome-vegetable tannage is to be obtained, otherwise the leather will be hard and brittle. Cr compounds penetrate rapidly and completely. For a successful T, the first tannage must not penetrate completely but should leave some layers of the pelt for the subsequent tannage. The most successful T is obtained by first treating the pelt with a slowly penetrating tanning material and then completing with a quickly penetrating material.

D. W.

Relation between the structure of the limed hide and the finished [vegetable-tanned] leather. R. H. MARRIOTT (J. Soc. Leather Trades Chem., 1935, 19, 169—183).—The general structure of the finished leather (L) is practically the same as that of the limed pelt and is only slightly altered by the vegetable-tanning process (V). Fibre bundles (F) which have been well separated in liming are only slightly more split up during the V, and the bad separation is evident in the L. The weave pattern of well-separated limed F becomes more horizontal in V, and F are shrunken thereby. Irregularly shaped deposits of tan are formed between badly separated F, but in well-separated F the tan is deposited around the individual fibrils so that they become clearly delineated by their dark-coloured periphery in a cross-section.

D. W.

Free water and vegetable-tanned sole leather. I. Experimental. R. S. EDWARDS (J. Soc. Leather Trades Chem., 1935, 19, 97—109).—The % free H_2O , F, defined as $100(W_T - W_D)/W_O$, where W_O , W_T , and W_D are the original wt. of the sample of vegetable-tanned sole leather (L), the max. wt. attained in aq. immersion, and the wt. after subsequent drying out, respectively. F is a const. for repeated soakings of a particular L, independent of the vol. of the H_2O used, increases as the time of immersion is increased, and is also affected by the previous immersion history. The superficial vol. (V_s) of L is increased by 0.5—10% by immersion, but the increase diminishes with successive immersions. V_s remains const. between the immersions, but the real vol. of L diminishes, and as it does so the equiv. free space in L increases and may be either $>$ or $<$ the free H_2O . The H_2O content of L in equilibrium with an atm. of 75% R.H. is not much affected by the successive immersions.

D. W.

(A) Acid action in leather. (B) Ammonia groups in relation to the acid content of the hide or of

leather. W. MOELLER (Cuir techn., 1934, 23, 208—212, 224—229, 240—242; 256—260; Chem. Zentr., 1934, ii, 3472).—(A) A discussion. The judging of quality and keeping properties from p_H measurements alone is criticised. Anions present are also important.

(B) Treatment of leather (I) with H_2SO_4 increases the NH_3 content of (I) considerably, due to oxidation of the products of the acid hydrolysis. Proteins form NH_3 and aldehydes. H. J. E.

Decolorisation of sole leather: simple method of measurement. G. BALDRACCO (Boll. Staz. Sperim. Ind. Pelli, 1935, 13, 104—110).—Lautenschläger's photo-electric colorimeter, devised for measuring the intensity of illumination of rooms etc., is applied to the measurement of the colour of sole leather. T. H. P.

Liesegang rings. Determination of silver, chromate, etc. in gelatin or agar gel. E. B. HUGHES (Analyst, 1935, 60, 309—312; cf. A., 1934, 840; 1935, 702).—Procedures are described for the determination of Ag and CrO_4^{2-} when (a) both are present in moderate quantities, (b) Ag is in excess, and (c) Ag is present in small amounts, and CrO_4^{2-} in small amounts or in excess. Washburn and Shear's method (A., 1933, 296) for the determination of $Ca_3(PO_4)_2$ gave satisfactory results. E. C. S.

Determining sulphonic acids in tanning agents.—See III. **Silks weighted with tanning materials.**—See VI.

PATENTS.

Preservatives for animal and vegetable substances. J. BLEECK (B.P. 428,347, 6.11.34).—Mixtures of Na_2SO_4 , NaF, Na_2SiF_6 , and kaolin are claimed.

D. W.

Gelatinous product. D. ABERNETHY (U.S.P. 1,974,228, 18.9.34. Appl., 29.9.31).—Glue or edible gelatin is put up in hard, catkin-like form having a large surface: vol. ratio. A method of manufacture suggested comprises granulation of the gelatinous material and extrusion with air under pressure.

B. M. V.

Manufacture of adhesives. DEUTS. HYDRIERWERKE A.-G. (B.P. 427,742, 24.10.33. Ger., 24.10.32).—Adhesive starches, e.g., potato, corn, or rice starch, glue, vegetable or animal gums, e.g., arabic, tragacanth, or cherry gum, gelatin, or agar, are improved as to swelling or spreading properties or durability, due to prevention of mould growth, by the introduction of 0.1—5.0% of saturated or unsaturated aliphatic or cycloaliphatic mono- or poly-hydric alcohols (C_8 — C_{18}), their sulphonation products, e.g., sulphuric esters or sulphonic acids, salts or esters of these substances, or mixtures thereof. A. W. B.

Manufacture of a cold-water-soluble adhesive [from starch]. E. R. EDSON, ASSR. to RUSSIA CEMENT Co. (U.S.P. 1,956,064, 24.4.34. Appl., 7.5.30).—Starch which has been partly or wholly dextrinised without disintegration of the granules is mixed with a small quantity of H_2O and alkaline modifying agents ($Na_2B_4O_7$, $NaBO_3$, and Na_2CO_3) and passed in a thin layer through ovens at controlled temp. The product contains the granules intact. The apparatus described in B.P.

359,704 (B., 1932, 77) is preferably used for the initial dextrinisation and the alkaline modification.

J. H. L.

Aq. liquids for leather etc.—See III. **Tanning composition.**—See XIII.

XVI.—AGRICULTURE.

Chemistry of infertile soils derived from rocks high in magnesium and generally high in chromium and metal. W. O. ROBINSON, G. EDGINGTON, and H. G. BYERS (U.S. Dept. Agric. Tech. Bull., 1935, No. 471, 28 pp.).—Serpentine soils examined are probably rendered infertile very largely as a result of the presence of large amounts of Cr and Ni and in some cases of Co. Cr occurs in an acid-sol. and an insol. form (ferrous chromite). Both Cr and Ni may be leached from the soils by aq. NH_4OAc , and also occur in considerable amounts in plants grown on these soils. Leachates contain much Ba. Infertility in such cases is not greatly affected by soil reaction, nor by the abs. or relative contents of Ca and Mg. A. G. P.

Methods for ascertaining the existing structural stability of soil aggregates. G. J. BOUYOUKOS (J. Amer. Soc. Agron., 1935, 27, 222—227).—Addition of KCl to deflocculated soils caused a decrease in settling vol. (I) and in H_2O -holding power. The structural stability of soil aggregates is examined by determining the (I) and moisture equiv. (II) after treatment with N -KCl. Three classes of soils are thus distinguished: (i) those in which vals. in N -KCl and in H_2O are the same, i.e., soils of stable structure; (ii) those showing reduction in both vals. by the action of KCl, i.e., soils of unstable structure; and (iii) an intermediate class in which vals. are reduced to a variable and moderate extent. In all cases changes in (I) and (II) are parallel.

A. G. P.

Structure and moisture condition of soils. L. SMOLÍK (Věstn. čechoslov. Akad. Zeměd., 1934, 10, 457—462; Chem. Zentr., 1934, ii, 3665—3666).—Crumb formation in soils is controlled by the H_2O content (I). For soils of different types the optimum (I) in this respect varied from 14% (sandy soils) to 38% (clay).

A. G. P.

Volume of the settled suspension of soil in water. L. SMOLÍK (Věstn. čechoslov. Akad. Zeměd., 1934, 10, 451—457; Chem. Zentr., 1934, ii, 3666).—"Settling vols." (I) of soils vary considerably (33—84 c.c. per 50 g. of dry soil). In many cases there is a relationship between (I) and the hygroscopicity, $CaCO_3$ content, and catalase activity.

A. G. P.

Improved hydrometer method for mechanical analysis of soils. G. J. BOUYOUKOS (J. Amer. Soc. Agron., 1935, 27, 319—320).—Frothing of the soil suspension in the pretreatment is counteracted by addition of a drop of Et_2O or preferably of a heavy alcohol (amyl) to the surface of the suspension.

A. G. P.

Removing and determining the free iron oxide in soil colloids. M. DROSDOFF and E. TRUOG (J. Amer. Soc. Agron., 1935, 27, 312—317).—The separated colloid in aq. suspension is treated with H_2S , and after neutralisation with aq. NH_3 is extracted with 0.1*N*-HCl.

Fe is determined in the centrifuged extract. Fe silicates are not decomposed in the process. Free colloidal Fe_2O_3 may be removed from soil without previous separation of the colloids. A. G. P.

(A) Determination of humus content. (B) Properties of humus of various soil types. V. M. BAJDALAKOV (Bull. Soc. Chim. Yougoslav., 1934, 5, 197—208, 209—217).—(A) The results obtained using different methods vary widely, Gustafson's combustion method being the most trustworthy.

(B) Analytical data are recorded. R. T.

Humus determination in sugar-beet soils. E. NAEHRING (Deut. Zuckerind., 1934, 59, 781—782; Chem. Zentr., 1934, ii, 3548—3549).—Humified material in soils is extracted by boiling for 0.5 hr. with 5% Na_2CO_3 solution, and the colour of the extract compared with standard tints in a Stammer sugar colorimeter. The K and P contents (Dirks-Scheffer) of soils varied inversely with the humus content. A. G. P.

Redox potential in soil. L. SMOLÍK (Věstn. českoslov. Akad. Zeměd., 1934, 10, 152—157; Chem. Zentr., 1934, ii, 3665).—Redox potential in podsols is highest in surface layers and decreases with depth. In the lowest illuvium it is negative. Surface layers of cultivated and forest soils show wide seasonal variations. A. G. P.

Colorimetric methods for determining soil reaction in agriculture or forestry. V. GÖSSL (Sborn. Masaryk. Akad. Práce, 1934, 8, 1—29; Chem. Zentr., 1934, ii, 3822).—The technique of various methods is examined and their suitability for particular purposes compared. A. G. P.

Base exchange in soils. J. LAVOLLAY (Chim. et Ind., 1935, 33, 1064—1071).—The mechanism of cation exchange in zeolites is considered in relation to soils. Ca/Mg ratios in various soils have been determined by HNO_3 and by cation exchange with NaOAc solutions. R. S.

Improvement in the intensity of action of artificial fertilisers. B. STEMPER (Sborn. českoslov. Akad. Zeměd., 1934, 9, 165—177; Chem. Zentr., 1934, ii, 3545).—The timing of fertiliser applications is discussed. The Mitscherlich "effect factor" is const. only when other growth factors remain unchanged. A. G. P.

"Kalimeter" for determining the potassium requirement of soils. K. KRUMINŠ (J. Landw. Riga, 1933, No. 7; Bied. Zentr., 1934, A, 5, 198).—The soil sample is shaken with an AcOH solution of NaNO_3 and the K content of the extract assessed by the turbidity produced on addition of Na cobaltinitrite and EtOH . The test is inapplicable to soils containing appreciable amounts of NH_3 , the presence of which in the extract is detected by Nessler's reagent. A. G. P.

A 25-year field comparison of high-magnesium and high-calcium limes. T. E. ODLAND and H. C. KNOBLAUCH (J. Amer. Soc. Agron., 1935, 27, 216—221).—High-Ca and -Mg limes, whether used in the form of oxides or carbonates, gave similar results provided the Mg supply in the soil was sufficient to obviate its influence

from a purely nutritional viewpoint. Soils limed to neutrality frequently showed signs of Mn deficiency. A. G. P.

Composition of black locust leaf mould and leaves: effect of the black locust. A. F. GUSTAFSON (J. Amer. Soc. Agron., 1935, 27, 237—239).—Analytical data are recorded and discussed. A. G. P.

Relation of varying rainfall to soil heterogeneity as measured by crop production. W. H. METZGER (J. Amer. Soc. Agron., 1935, 27, 274—278).—In field trials, high negative correlation is shown between rainfall data and soil heterogeneity as indicated by variability in crop yields in duplicate tests. A. G. P.

Nitrogen fixation by legumes in relation to the nutrient content and reaction of the soil. I. G. BJÄLFVE (Medd. Centralanst. Försöks. Jordbruks., No. 443, 21 pp.; Chem. Zentr., 1934, ii, 3547).—Liming of acid soils improves the yield and inoculation becomes unnecessary. The NO_3^- content of the soil increases during the growth of the plants. A. G. P.

Sensitivity of the potato plant to soil aëration. J. BUSHNELL (J. Amer. Soc. Agron., 1935, 27, 251—253).—Insufficient aëration may become a limiting factor in potato yields on silts and the heavier soil types. A. G. P.

Limitations of plant-juice analyses as indicators of the nutrient needs of plants. J. M. POEHLMAN (J. Amer. Soc. Agron., 1935, 27, 195—207).—Moderate applications of fertilisers had no significant effect on the concns. of NO_3^- , P, or K in the expressed juice (I) of soya-bean plants in the first year of treatment. Repetition of manurial treatment in a second season induced relationships between the P and K in (I) and the fertilisers applied. Seasonal conditions had a greater influence than soil conditions on the composition of (I). It is improbable that crit. concns. of minerals in (I) can be established as indicators of the nutrient status of soils. A. G. P.

Uniformity trials with rice. C. L. PAN (J. Amer. Soc. Agron., 1935, 27, 279—285).—Statistical methods are utilised to establish the most effective size and shape of experimental plots in field trials. A. G. P.

Control of weeds in young cereals. G. SUNDELIN (Medd. Centralanst. Försöks. Jordbruks., No. 427, 11 pp.; Chem. Zentr., 1934, ii, 3426).—Good results were obtained by spraying with 3.5—4.0% H_2SO_4 (800—1200 litres per hectare). Treatment with 15—20% FeSO_4 solution, with "Raphanite," and with CaCN_2 was effective but more costly. Use of $(\text{NH}_4)_2\text{SO}_4$ — H_2SO_4 mixtures or 20% solution of NaNO_3 is not recommended. A. G. P.

Fertilisers and sugar beet, 1932. L. DECoux (Publ. Inst. Belge Amél. Betterave, 1933, No. 1, 1—31).—The mineral requirement of beet is examined and the economic use of fertilisers discussed. A. G. P.

Rational culture of sugar beet. L. DECoux and J. VANDERWAEREN (Publ. Inst. Belge Amél. Betterave, 1935, 3, 1—28).—Growth conditions, manuring and cultural methods are considered. A. G. P.

Effect of variations in stand on yield and quality of sugar beet grown under irrigation. H. E.

BREWBAKER and G. W. DEMING (J. Agric. Res., 1935, 50, 195—210).—The effect of spacing of plants on growth and sugar yield is examined. A. G. P.

Fore-lifting of sugar beets under Schleswig conditions. T. BRAUN (Diss., Univ. Breslau; Z. Wirts. Zuckerind., 1935, 85, 1—31).—If a few days before harvesting, each plant is lifted out of the soil, to break the root fibres, and then replaced loosely in its bed, to prevent unnecessary loss of H_2O , migration of sugar and other substances takes place from the dying leaves to the root, and an increased yield of sugar is obtained when the roots are finally lifted and topped. In Russia, over a 5-year period, the process has given an average increase of 0.75% in the sugar content of the roots and an increase of 2 cwt. of sugar per acre. The increase is greatest in sunny weather. Experiments elsewhere have given rather conflicting results. The author's experiments in Schleswig showed an improvement with ripe beets in yield of sugar and purity of juice, but a deterioration in both respects with unripe beets. The optimum period between fore-lifting and final lifting was 2—3 days. With ripe beets the average effects of fore-lifting were a fall of 1.5% in the H_2O content of the roots, a rise of 0.55% in their sugar content, a rise of 3 cwt. in the yield of sugar per acre, and a rise of 3% in purity of juice. J. H. L.

Influence of the lime status of vulcanic Merapi ash soils on the quality of Vorstenland tobacco. H. A. MIDDELBURG (Proefstat. Vorstenland Tabak. Med., 1932, Klaten 75; Bied Zentr., 1934, A, 5, 212).—European methods for CaO determination are only partly applicable to tropical soils. Base absorption may be determined by Vageler's modified method. Liming improved the growth and quality of tobacco. Manuring with P resulted in rapid development and early maturity. Application of S impaired quality and burning properties and frequently caused weak growth in the plants. A. G. P.

Boron deficiency in tobacco under field conditions. J. E. McMURTREY, JUN. (J. Amer. Soc. Agron., 1935, 27, 271—273).—Effects of B deficiency on crop growth are described. A. G. P.

Organic thiocyanates as insecticides. F. WILCOXON and A. HARTZELL (Contr. Boyce Thompson Inst., 1935, 7, 29—36; cf. B., 1935, 38).— $CH_2(CH_2SCN)_2$ (I) controlled a no. of injurious insects and was more effective than the isomeric propylene compound. Plant tolerance for (I) was slightly $>$ that for $OPh[CH_2]_3SCN$ previously examined. A. G. P.

Fatty acids and their soaps as contact insecticides. L. E. DILLS and H. MENUSAN, JUN. (Contr. Boyce Thompson Inst., 1935, 7, 63—82).—The order of toxicity of the fatty acids to *Aphis rumicis* and *Macrosiphum rosae* was decoic (I) and lauric (II) $>$ oleic (III), octoic (IV), $>$ myristic (V), hexoic (VI), palmitic (VII), $>$ stearic (VIII). The corresponding vals. for the K soaps were (I), (II), (III) $>$ (IV), (V), (VII) $>$ (VI), (VIII). Addition of nicotine (IX) to the K soaps did not alter the order of toxicity. In mixtures of K soaps and (IX) sulphate, the effect of (IX) was not always strictly additive, owing to differences in the spreading action of the mixtures. K soaps from olive oil were more

effective than those from coconut, castor, maize, palm, cottonseed, or menhaden fish oils. The surface tension and angle of contact of soap solutions are examined in relation to toxicity. The order of toxicity of soaps to plants was the same as that towards insects. A. G. P.

p-Dichlorobenzene, an effective herbarium insecticide. F. C. GATES (Science, 1935, 81, 438—439).— $p-C_6H_4Cl_2$ kills all forms of the pests which occur in a herbarium and can be used *in situ*. L. S. T.

Soft rot of potatoes caused by *Pythium ultimum*. Trow. W. JONES (Sci. Agric., 1935, 15, 402—410).—Infection (I) of cut potato sets is avoided by permitting the growth of a callus (48 hr. in a moist atm.) before planting. Dusting the cut surface with S decreased (I) if 24 hr. elapses between treatment and planting. Use of $HgCl_2$ was ineffective. Optimum growth of the fungus occurs at p_H 6.0—8.0. A. G. P.

Fumigation of seed potatoes with hydrocyanic acid. G. KÖCK (Forts. Landw., 1933, 8, 102—104; Bied. Zentr., 1934, A, 5, 232).—Treatment of tubers with 1 vol.-% of HCN for 1—4 hr. accelerates sprouting. A. G. P.

Thiourea prevents browning of plant tissues and juices. F. E. DENNY (Contr. Boyce Thompson Inst., 1935, 7, 55—61).—Treatment of cut slices of fruits or potato tuber with 0.1% solutions of $CS(NH_2)_2$ (I) prevented or retarded darkening in air. Addition of (I) to fruit juices to produce 0.01% concn. prevented darkening of fresh juices and partly or wholly decolorised those already discoloured by exposure. Oxidation of apple juice involves two simultaneous reactions: (i) rapid reversible formation of a dark brown product capable of reduction by (I) or pineapple juice (II), and (ii) slow irreversible production of a light brown substance inhibited by (I) but not by (II), the reduction of which cannot be effected by (I) or (II). A. G. P.

Apple scab and spray materials for its control in the Hudson valley. J. M. HAMILTON (New York State Agric. Exp. Sta. Tech. Bull., 1935, No. 227, 56 pp.).—Field trials recorded emphasise the importance of the correct timing of spray applications. The efficiency of $CaO-S$ (I) as a post-infection spray is increased by admixture with Pb arsenate (II), but not with Ca arsenate (III), Mg arsenate, or cryolite. The adhesiveness of wettable S (IV) sprays may be reduced by additions of CaO in amounts $>$ 3 lb. per 100 gals. The resistance of (I)–(II) sprays to rain and weathering is notably high. The amount of As residue from (I)–(III) preps. is $>$ from (IV)–(III) sprays. Use of (I)–(III) sprays should be confined to the hardier varieties. S is toxic to apple pollen, but, provided 1—2 days under favourable pollinating conditions are allowed, spraying during blooming is permissible. A. G. P.

Determining grain size.—See I. Fertilisers from brown coal.—See II. Determining Na in K salts. Ammoniated double superphosphate.—See VII. Patchouli.—See XX.

See also A., June, 786, Determining soil fertility. 794, N absorption by plants. Germination of seeds. 797, Mineral nutrition in Victorian fruit trees. Toxicity of Al to seedlings. 798, Yellow tobacco mosaic.

PATENTS.

Insecticide. W. M. DICKSON, Assr. to GEN. CHEM. CO. (U.S.P. 1,955,114, 17.4.34. Appl., 11.5.31).—Claim is made for a mixture of $\text{Pb}_3\text{As}_2\text{O}_8$ (80) and $\text{Fe}_3\text{As}_2\text{O}_8$ (10) with CaO or Bordeaux mixture (10%). A. R. P.

Manufacture of insecticidal, fungicidal, and like materials. E. I. DU PONT DE NEMOURS & Co. (B.P. 426,051 and 426,102, 25.9.33. U.S., 24.9.32).—(A) Stable emulsions, of high wetting power, of tetra-methyl- or -ethyl-thiuram monosulphide (I) are made by mixing mineral or fatty oil solutions of (I) with dil. alkaline (e.g., Na_3PO_4 , NaOH, borax, NH_3 , alkylamines) solutions of casein (1–10% on oil), with trace of oleic acid if desired. (B) Spraying liquids are obtained by emulsifying mineral oil solutions of aryl mercuri-compounds, e.g., Ph mercuri-acetate or oleate, in the dil. alkaline solutions of casein, base or alkali being in excess. A. W. B.

Wettable sulphur composition. P. D. PETERSON, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,973,910, 18.9.34. Appl., 12.5.31).—The mixture comprises S 100 g., sulphite-liquor solids 1–3 g., and CaO-S solution 5–8 c.c. (d 1.28). The product (a fungicide) may be applied as a dust or in the form of an aq. emulsion. B. M. V.

Disinfectants.—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Pectins [in beetroots], their nature, detection, and determination. H. COLIN (Bull. Assoc. Chim. Sucr., 1935, 52, 95–112).—Of the two components of beet-pectin, viz., tetra-araban and Ca pectate (I) (A., 1929, 360, 1273), some of the former usually dissolves in diffusion juice, and is not pptd. on liming. Practically no (I) dissolves from fresh beets, or at least none escapes pptn. on liming. During the storage of beets the pectin becomes more sol. and acquires marked reducing power, probably owing to formation of pectolactonate (A., 1932, 1063) by partial rupture of the tetragalacturonic acid complex. Various reactions are considered as means of detecting or determining pectins in beet products; the most useful appear to be the naphthoresorcinol reaction (by which < 0.15–0.2% of pectin can be detected in beet juice), the production of furfuraldehyde (B., 1933, 806), and the evolution of CO_2 on heating with HCl. In some cases the determination of OMe groups in pectate by Zeisel's method might prove useful. J. H. L.

Theory of purification of [beet] juice by lime. N. E. LOGINOV (Bull. Assoc. Chim. Sucr., 1935, 52, 126–134).—The purifying effect is attributed to a chemical action of a small proportion of the CaO used, and an adsorptive action of the remainder during carbonatation. The theory is developed mathematically on the basis of Freundlich's adsorption formula. J. H. L.

Incrustations in [beet-sugar factory] evaporating plant. O. SPENGLER, K. ZABLINSKY, and S. BÖTTGER (Z. Wirts. Zuckerind., 1935, 85, 47–88).—Detailed data on the quantity and composition of evaporator incrustations (I) in 6 German sugar factories are discussed in relation to the methods of juice purification employed. No great variations occurred in the same factory in the course of several months, but the I in different factories

differed widely in respect of SiO_2 , CaSO_3 , CaSO_4 , and $\text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3$, necessitating a boiling-out in some cases every 1–2 weeks and in others only once in a campaign. In general, apart from some org. matter, the chief constituent of evaporator I is CaC_2O_4 , which is probably formed mainly during the evaporation (B., 1929, 223; 1930, 260). The other most objectionable constituents, SiO_2 , CaSO_3 , and CaSO_4 , are derived mainly from the materials used in purifying the juice, and they can be reduced to a min. if the purification is well conducted. To minimise SiO_2 the CaO used, especially for the second carbonatation, should be substantially free from "sugar-sol." SiO_2 (B., 1930, 260, 860; 1931, 509). The attainment of the optimum end-point in final carbonatation is important, not only to prevent deposition of CaCO_3 , but also to make possible a final sulphuring without serious deposition of CaSO_3 . None of the deposits examined contained much CaCO_3 or MgO. Cold pre-liming in the purification of juice reduces incrustations. For the removal of incrustations by "boiling-out" the procedure recommended for the majority of cases is, after rinsing out with H_2O , to boil first with 2% aq. Na_2CO_3 , then for 15–30 min. with clean H_2O and then with 1–2% HCl, and finally to rinse well with H_2O . Highly siliceous deposits require more drastic treatment. J. H. L.

Impurities in white sugars. VIII. Effects of some impurities on decomposition of sucrose during the barley candy test. J. A. AMBLER and S. BYALL (Ind. Eng. Chem. [Anal.], 1935, 7, 168–173).—When white sugar containing many org. and inorg. impurities is heated, sucrose (I), invert sugar, and hydrolysable and non-hydrolysable anhydrides are formed, and discoloration (II) may result. Neutral or acidic salts inhibit (II), but aid the formation of (I). Alkaline salts increase (II) and decrease (I). NH_4 salts, NH_2 -acids, amides, and Fe salts increase (I) and (II). The production of colour is discussed. J. L. D.

Turbidity in sugar products. III. Transmittancy and Tyndall-beam intensity of solutions of raw cane sugars. F. W. ZERBAN, L. SATTLER, and I. LORGE (Ind. Eng. Chem. [Anal.], 1935, 7, 157–162; cf. B., 1934, 646).—The turbidity and concn. of colouring matter in many sugar solutions are determined as before (*loc. cit.*), and agree with vals. obtained by Balch's method (cf. B., 1931, 606) if the particles in the unknown solution (I) are identical with those of the standard. Discrepancies afford an indication of the nature of the particles in (I). J. L. D.

Presence of manganese in maple and cane sugar. P. RIOU and J. DELORME (Compt. rend., 1935, 200, 1132–1133).—Mn is present in the raw sugars, and is eliminated during refining. It varies between well-defined limits in maple sugar. R. N. C.

Economics of the production of wood sugar and of spirit and fodder yeast therefrom. H. CLAASSEN (Z. Wirts. Zuckerind., 1935, 85, 32–46).—Reasoned estimates of the cost of raw material and manufacture confirm the general conclusions recently expressed (B., 1933, 121) as to the uneconomic character of the industry, whether for the production of fodder sugar, EtOH, or fodder yeast. J. H. L.

Effect of different buffers and type of substrate on diastasis of wheat-starch. C. E. MANGELS and J. J. MARTIN, JUN. (Cereal Chem., 1935, 12, 256—268).—Wheat flour (*W*) produced more maltose in 1 hr. with Sørensen's phosphate buffer (I) than with McIlvaine's (II) or Walpole's (III) buffer. (II) exhibited a p_H optimum (*P*) at 5.0, (I) one at 5.2—5.6, and (III) did not exhibit a *P* with *W* as substrate (*S*). Using a pure raw starch *S* (IV), and malt- and taka-diastase (*M*) as enzyme preps. (*E*), *P* tends to shift to the alkaline side. *P* for (II) shows greater shift than for (I). Using a cooked starch *S* (V) and *M*, *P* as compared with (IV) tends to shift to the acid side. Much greater maltose formation occurs when (V) is used than with (IV) when using equiv. amounts of *E*. With malt-diastase, 60—70% of *S* is converted into sugar when (V) is used, whilst the same quantity of enzyme will convert only 2% of (IV) under similar conditions. The difference in sugar formation due to cooking the starch is so great that the results with (V) are of practically no val. in predicting the diastatic activity of raw or natural starch. E. A. F.

Sugar beet.—See XVI.

See also A., June, 699, **Sedimentation of potato starch.** 734, **Determining reducing sugars.** Prep. of *l*-xylose. 797, Prep. of walnut starch.

PATENTS.

Treatment of sugar melts. D. V. WADSWORTH and L. WICKENDEN, Assrs. to J. J. NAUGLE (U.S.P. 1,956,260, 24.4.34. Appl., 27.9.29. Renewed 12.7.33).—Melts are prepared and sterilised as in B.P. 366,525 (B., 1932, 297). Sterilisation may be followed by addition of solid NaH_2PO_4 and/or Na_2HPO_4 to ppt. Ca^{++} and Fe. After transport the melts are decolorised with active C and boiled as usual for refined sugar. J. H. L.

Preparation of [β]-lactose. P. F. SHARP, Assr. to CORNELL UNIV. (U.S.P. 1,956,811, 1.5.34. Appl., 16.3.29).—Lactose syrups are conc., with vigorous agitation, at such a temp. (e.g., $> 93^\circ$) that only the β -form crystallises. The crystals are separated by centrifuging and may be washed with H_2O . J. H. L.

Steeping process [in maize starch manufacture]. H. W. CURRY and F. M. SAYRE, Assrs. to INTERNAT. PATENTS DEVELOPMENT CO. (U.S.P. 1,955,112, 17.4.34. Appl., 19.11.30).—To lessen the formation of sol. matters due to enzymes or micro-organisms during steeping (*S*), especially in countercurrent battery *S*, the maize, preferably before it is mixed with the *S* liquid, is impregnated with gaseous SO_2 (e.g., 500 lb./1000 bushels) or other sterilising agent. Addition of SO_2 to the *S* liquid, which may be gluten H_2O , is unnecessary. J. H. L.

Manufacture of starch-disintegration products capable of forming films. W. J. TENNANT. From DEUTS. MAIZENA GES.M.B.H. (B.P. 421,593, 23.6.33).—Starch is subjected to known disintegrating processes, e.g., to the action of cold aq. NaOCl , or to admixture with 1—3% of Me_2SO_4 , until the product is capable, when boiled with H_2O , e.g., in 25% solution, of forming transparent flexible films on cooling. J. H. L.

Preparation of glucosides [of higher aliphatic alcohols]. H. T. BÖHME A.-G. (B.P. 421,318, 30.4.34. Ger., 3.6.33).—Penta-acylhexoses are heated with higher alcohols in presence of condensation agents such as ZnCl_2 , and from the resulting glucosides the acyl groups are eliminated by saponification. The products, e.g., laurylglucoside, may be used as such or after sulphonation, phosphatisation, etc., as textile adjuvants, on account of their surface active properties. J. H. L.

Adhesives.—See XV.

XVIII.—FERMENTATION INDUSTRIES.

Yeast gum. I. Determination in yeast. F. STOCKHAUSEN and K. SILBEREISEN (Woch. Brau., 1935, 52, 145—147).—Methods available for the determination of yeast gum (I) and glycogen (II) are reviewed. In a preferred method, (I) and (II) are extracted from yeast with boiling 65% KOH solution, the extract being diluted to standard vol. and filtered overnight, precautions being taken against evaporation. In an aliquot portion of the filtrate, EtOH is added to 70—75% concn. in presence of NaCl, and the washed ppt. dissolved in 2% aq. KOH. (I) is pptd. from an aliquot portion of this solution (III) by treatment with Felling's solution, and the Cu compound decomposed and hydrolysed with boiling 4% HCl (3 hr.), the glucose equiv. being determined in the resultant liquor (Kjeldahl-Bertrand) and calc. to (I). Another aliquot portion of (III) is hydrolysed directly with boiling 4% HCl (3 hr.) and the glucose equiv. again determined. The result, after correction for (I), enables (II) to be calc. I. A. P.

Influence of water content and temperature on the chemical changes in malt during kilning. P. KOLBACH and E. SCHILD (Woch. Brau., 1935, 52, 129—134, 137—141, 147—150; cf. B., 1934, 695).—With rising kiln temp., the changes taking place are successively due to (I) enzyme action during growth, (II) enzyme action when growth has ceased, and (III) chemical changes. The relative desirability of (I), (II), and (III) in the prep. of different types of German malt is discussed. Rising kiln temp. (up to 60°) causes increase in total (*T*) and fermentable (*F*) cold- H_2O extract, the extent of the increases being smaller with diminishing initial H_2O content (IV), there being an apparent decrease with (IV) of 15%. The limiting temp. above which extract increases are approx. 25° , 30° , and 50° for (IV) of 43%, 34%, and 24%, respectively. With (IV) of 11.5% there are appreciable decreases in *T* and *F* at 60 — 90° which are not wholly explained by protein coagulation; with (IV) of 5.2% the decreases are smaller. The temp. optimum for protease action (V) increases with decreasing (IV), but the max. val. for permanently-sol. N (VI) decreases. The temp. optima for peptidase action are regularly $<$ those for (V). Proteolysis is less dependent on (IV) than is starch hydrolysis. With rising kiln temp. the ratio formol-N/(VI) decreases, due to relative inactivation of peptidase. The decrease of (VI) at high temp. runs parallel to loss in *T*, both losses being probably due to the melanoidin reaction. Loss of coagulable N begins at a relatively low temp. Measurement of p_H and buffer val. (7.07—4.27) gave large differences between different malts, but,

in general, after no change or a small increase at the lowest kiln temp., the p_H falls at higher temp., the simultaneous changes in buffer val. being dependent on (IV) of the green malt. At 80–90° and (IV) = 11.5% the melanoidin reaction produces titratable acid and a strong fall in p_H , and diminishes the fall in buffer val. which would otherwise occur. In the above, "kilning" was carried out by maintaining the malt in sealed cans at the desired temp for 8 hr. I. A. P.

Chemical processes in alcoholic fermentation. H. HAEHN (Woch. Brau., 1935, 52, 172–176).—The development of chemical fermentation theories is traced, individual theories being described and discussed. I. A. P.

Thermophilic fermentation of beet pulp. O. L. OSBURN, J. STRITAR, and C. H. WERKMAN (J. Agric. Res., 1935, 50, 165–172).—Fermentation by soil-enrichment cultures was most efficient at p_H 9.0 under anaerobic conditions. The yield of acids ($AcOH$, $PrCO_2H$, and less frequently $EtCO_2H$) may be > 50% of the wt. of beet. Cellulose, pectin, and pentosans were decomposed at approx. the same rates. Lignin was unattacked. A. G. P.

Determination of diastatic strength. R. IRVIN (Cereal Chem., 1935, 12, 142–145).—A rapid volumetric procedure is described for determining the sugar formed by diastases. The method was standardised with taka-diastase; its applicability to malt- and animal diastase requires to be checked. E. A. F.

Lactic acid content of beer. W. BICKER (Deuts. med. Woch., 1934, 58, 1562–1563; Chem. Zentr., 1934, ii, 3686).—Vals. are recorded. Na lactate irritates the intestine. H. J. E.

Treatment of spirits with the "oxyesterator." A. FREY (Deuts. Destillateur-Ztg., 1934, 55, 415–416, 419–420; Chem. Zentr., 1934, ii, 3858).—The method and its applications are described. H. J. E.

Spirit from wood sugar.—See XVII. **Brewing H_2O .**—See XXIII.

See also A., June, 782, **Determining concn. of enzyme preps.** Prep. of cozymase. 783, **Purification of enzymes.** Prep. of starch substrates for amylase determinations. 784, **Prep. of highly active phosphatase.** Yeast-phosphatase.

PATENTS.

Vitamin concentrates. STANDARD BRANDS, INC. (B.P. 428,044, 31.8.33. U.S., 26.1.32).—Yeast is liquefied by treating with 1–3% of a volatile solvent (e.g., $EtOAc$, Et_2O , $CHCl_3$) for $\frac{1}{2}$ hr., after which $EtOH$, $MeOH$, or further $EtOAc$ (to approx. 40%) is added to assist filtration. After setting aside for 24 hr. to enable proteins to coagulate, filtration through a filter-press follows, and the filtrate is conc. *in vacuo* to contain approx. 80% solids. The product has an approx. potency of 125 units of vitamin-B and 25 units of -G. It may be utilised in the prep. of food products etc., e.g., by mixing with starchy materials, starch-conversion products, dried malt, or wheat-germ extract. The filter residue may be used in the prep. of ergosterol. I. A. P.

Production of butyl alcohol by fermentation. C. W. HANCOCK, ASSR. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,969,218, 7.8.34. Appl., 28.11.32).—A distilled, fermented mash, containing an approx. 1:1 mixture of H_2O and mixed solvents ("AB charge") is treated with, e.g., $NaOH$ to neutralise the acids present. Further distillation then yields high-grade solvents of low acid content, and the aq. residue may be used to replace part of the H_2O employed in the prep. of subsequent mashes, whereby the yield of solvents is materially increased. The process is a general one for use with $BuOH-COME_2$ bacteria. I. A. P.

Products containing *L. acidophilus*.—See XX.

XIX.—FOODS.

Granulation of whole-wheat meal and method of expressing it numerically. G. H. CUTLER and G. A. BRINSON (Cereal Chem., 1935, 12, 120–129).—A test is described for determining the granulation (G) of whole-wheat meal (M) and a method illustrated for expressing it as a sp. no. (N). G varies widely among different classes and varieties of wheat, and appears to be a highly stable varietal characteristic, possibly much more so than kernel texture and gluten strength (G) [as measured by the fermentation test (F)]. N appears to be roughly directly correlated with starchiness and roughly negatively with G (as measured by F). Bread-flour wheats have a low N , pastry-flour wheats a high N . E. A. F.

Catalase activity in wheat flour. M. J. BLISH and C. E. BODE (Cereal Chem., 1935, 12, 133–142).—A simple manometric procedure is described for the measurement of catalase activity (C) of flours (F). Among F of comparable grade, but of widely different origin, C varied widely and systematically with the regional or climatic origin of the samples; Canadian F had nearly 4 times the C of Texas or Kansas F . Wheat type or habit appears to affect C . Spring wheats (W) showing substantially higher val. than winter W grown under the same conditions. Among W of the same habits, varietal differences were not apparent. A definite relation between C and flour grade (as determined by ash content) exists only in F from W produced in the same locality. Flour-catalase appears to be a single and not a multiple factor. C is significantly reduced by bleaching agents, and by natural ageing at room temp., and is greatly reduced by fine grinding in a ball mill. E. A. F.

Factors which affect the diastatic activity in wheat. C. O. SWANSON (Cereal Chem., 1935, 12, 89–107).—The cause of the low gassing rates of the past few crops of Kansas wheat was investigated. Variety is a factor affecting diastatic activity (D), but not as dominant a factor as those operating during ripening and harvesting or artificial wetting. Hard spring wheats (W) are usually of higher D than hard winter W , but soft winter W are of relatively low D . W grown under very dry conditions were lower in D than W grown under more moist conditions. The same variety of wheat grown in different localities showed a large variation, probably induced by response to environment.

Flours (*F*) milled on an experimental Allis mill (short system) had only about 60% of the *D* of *F* milled on a long-system mill, the *D* of the latter being approx. that of the *W*. *D* is not increased by wetting *W* until the H_2O content is sufficient to initiate germination, nor by alternate wetting and drying unless wetting is continued for a considerable period. The diastatic enzymes in the endosperm, and hence in *F*, probably exist in the form of pro-enzymes which may be activated by H_2O ; their amount probably depends on the conditions during kernel formation and ripening. E. A. F.

Factors affecting the diastatic activity of wheat flour. II. W. R. STELLER, M. C. MARKLEY, and C. H. BAILEY (Cereal Chem., 1935, 12, 268—275; cf. B., 1934, 1031).—Composite samples of the patent flours are as satisfactory for the determination of the relative diastatic activity (*A*) of different wheat varieties as the means of individual sample determinations, provided that only sound ungerminated samples be used. Wheat samples may be compared with nearly as much reliability as flour samples (*F*) for *A* determinations. The digestion period in the case of *F* may be reduced to $\frac{1}{2}$ hr. without great loss in accuracy. An abundance of β -amylase was found in all the *F* studied (cf. B., 1934, 1031). A third limiting factor (*L*) for enzymic saccharification was found; *L* was apparently associated with the starch, and could be removed or inactivated only by prolonged dialysis. E. A. F.

Peptisation of wheat-flour proteins by organic acids. C. E. MANGELS and J. J. MARTIN, JUN. (Cereal Chem., 1935, 12, 149—157).—The peptising power for flour proteins (*P*) of AcOH (*A*), lactic acid, $H_2C_2O_4$ (*O*), tartaric and citric acids in concns. of 0.1*N*, 0.5*N*, *N*, and 2*N* was determined. With the exception of *A*, the 0.1*N*-acids peptised more protein than those of higher concn. *O* had a lower *P* at all concns. than the other 4 org. acids used. HCl and H_2SO_4 dispersed less protein than did the org. acids (*I*), but H_3PO_4 was similar in effect to (*I*). *P* increased: (1) directly as pH , (2) with the introduction of CH_2 into *A* (further CH_2 -groups produced no effect), (3) with the introduction of OH groups into (*I*). Regional and varietal variations in *P* were of similar magnitude to those with neutral salt solutions (*S*) (cf. B., 1934, 521). Varieties which show a high resistance to the peptising action of *S* were most susceptible to (*I*). E. A. F.

Mixing-time experiments with flours milled from different classes of wheats. R. WEAVER and C. C. FIFIELD (Cereal Chem., 1935, 12, 281—288).—A no. of experimentally and commercially milled flours (*F*) were mixed for varying periods in the Hobart-Swanson mixer. The mixing periods required to incorporate the ingredients are $\frac{3}{4}$ min. for experimentally milled soft red winter and soft white wheat *F*, and 1—1 $\frac{1}{2}$ min. for experimentally and commercially milled hard red spring wheat *F* and experimentally milled hard red winter wheat *F*. The increase in loaf vol., improved grain and texture, and lighter crumb colour produced by prolonged mixing are apparently the result of gluten development. As the time of mixing is increased (e.g., to 2—3 min.), the variability between duplicate tests decreases. E. A. F.

Report of the 1933-4 Pie-Flour Committee. C. B. KRESS (Cereal Chem., 1935, 12, 158—160).—It is considered that pie flour can be judged by the usual physical and chemical tests (protein, ash, granulation, colour, and pH determinations) coupled with a standard baking test, complete details of which are given. E. A. F.

Report of the 1933-4 Committee on Methods of Testing Self-Raising Flours. H. G. WALTER (Cereal Chem., 1935, 12, 161—164; cf. B., 1934, 167).—A standard dough consistency was agreed on for the biscuit-baking test, and the possibility of setting up standards for scoring vol., grain, and flavour of the resulting biscuit investigated. E. A. F.

Characteristics of flours according to baking quality: gassing curves of [wheat] flour streams. W. GRÜNDER (Mühlenlab., 1935, 5, 73—78).—The gassing-power (*G*) curves of the various flour streams (*S*) obtained in milling wheat by the system used in Germany have been determined. The high *G* of the fourth (*I*), fifth, and sixth breaks appears to be due to the fact that the germ (the main seat of the diastase and protease) frequently passes to (*I*) in smaller mills. By determining the gluten and gassing characteristics of *S*, and also taking into account the proportions in which they are formed, their colour and ash contents, it is possible so to blend *S* that a product having the required baking characteristics is obtained. E. A. F.

Diastatic supplements for the A.A.C.C. baking test. II. Q. LANDIS, C. N. FREY, and S. A. McHUGH (Cereal Chem., 1935, 12, 302—304; cf. B., 1934, 167).—The amount of sugar (S_s) which must be added in the A.A.C.C. baking test in order to give a const. sugar concn. in the test loaf was calc. from the equation (*I*) $S_s = 11.4 - (1.96s + p)$, where $p = \%$ of sugar at 1 hr. (primary saccharogenic val.) and $s =$ amount formed during the 2nd hr. of diastasis (secondary saccharogenic val.). The reliability of (*I*) was tested on 10 flours from wheats grown in the United States. The mean val. for the residual sugar content (3.78%) was lower than the calc. (4%); this was to be expected, since the diastatic vals. were determined in fermenting suspensions which have a higher sugar level than doughs. The greatest deviation was found in highly diastatic Montana Marquis. E. A. F.

Milk powder for the cake-baking test. R. T. BOHN (Cereal Chem., 1935, 12, 300—302).—Milk powder used in the A.A.C.C. cake-baking test should conform to the requirements of the "Extra Grade" of the American Dry Milk Institute. Spray-process milk powder appears preferable to roller-process milk (*R*) owing to its greater solubility and uniformity; cakes made from *R*, however, obtained a higher baking score. E. A. F.

Cake-baking method for testing soft wheat flours. Standardisation of cream of tartar. L. K. TRACK (Cereal Chem., 1935, 12, 295—299).—The effect of increasing or decreasing the amount of leavening agent (*L*) (KH tartrate + $NaHCO_3$), with and without increases in the amount of sugar (*S*), and of increasing the amount of shortening, with and without increasing *S* and *L*, in the basic formula of the A.A.C.C. (B.,

1932, 860) was investigated. It is recommended that the amounts of *L* be kept as in the original formula.

E. A. F.

Study of physical and chemical properties of dried egg-albumin with the view of standardising this substance for the official cake-baking test. C. A. GLABAU and E. KEPES (Cereal Chem., 1935, 12, 108—120).—Commercial egg-albumin (*A*) varies in p_H , surface tension (γ), beating property, d of foam produced, γ and p_H of batter, baking properties of test cake (d and penetration of cake batter, cake score, photomicroscopic cell structure of cake), and swelling power (*S*) of cake crumb. Some of these differences, at least, appear to be responsible for the variations in the structure of the finished cake. Changes in the properties (*P*) of *A* affect the *S* of cake crumb which has been compressed to a definite degree of thickness. *P* seem to vary with the time *A* has been fermented.

E. A. F.

Growth of bread moulds [*Aspergillus niger*] as influenced by acidity. G. W. KIRBY, C. N. FREY, and L. ATKIN (Cereal Chem., 1935, 12, 244—255).—The effect of the weak acids used in "rope" control in bread on the development of *A. niger* (*A*) was investigated. In a liquid bread medium *A* exhibits no well-defined optimum p_H for growth; *A* developed equally well in the normal range of p_H in bread-making, or between p_H 4.5 and 6.8. 0.2, 0.4, and 0.6% of $\text{CaH}_4(\text{PO}_4)_2$, and tartaric, phosphoric, lactic, and citric acids exerted no apparent effect on the growth of *A* in a liquid bread medium at p_H 3.5. Under the same conditions 0.2, 0.4, and 0.6% of AcOH completely inhibited the growth of *A*. The [AcOH] required completely to inhibit the growth of *A* decreased with the p_H . In the concn. of 90-grain vinegar used in "rope" control (0.5—1%) there is some inhibition of the growth of *A* if the p_H of the bread is about 5.0—6.2. Hence the growth of *A* would not be stimulated by the usual "rope" inhibitors.

E. A. F.

Occurrence of acetylmethylcarbinol in bread and its relation to bread flavour. F. V. HOOFT and F. J. G. DE LEEUW (Cereal Chem., 1935, 12, 213—229).—The pleasant flavour of bread is partly due to Ac_2 (I) formed in traces in the finished loaf by the slow oxidation of the $\text{CHAcMe}\cdot\text{OH}$ (II) produced during the fermentation (*F*) of the dough; a 1-lb. commercial (U.S.) loaf contains about 30—60 mg. of (II). A method was devised for determining (II) in dough and bread by oxidising (II) to (I), which is determined after distillation as Ni glyoxime. Factors which favour the formation, and disfavour the reduction, of (II) are: a high sugar-yeast ratio, diastatic preps., a low *F* temp. (25°), a short *F* period (e.g., 2—3 hr.), a sponge-dough process, presence of H_2 acceptors (e.g., KBrO_3 , H_2O_2 , or O_2), and proper yeast selection.

E. A. F.

Influence of amyl ether on the indicated fat percentage in the Gerber process [for milk analysis]. New test for suitability of amyl alcohol. D. O'SULLIVAN (Analyst, 1935, 60, 301—306).—($\text{C}_5\text{H}_{11}\text{O}$) (I) present in the $\text{C}_5\text{H}_{11}\cdot\text{OH}$ (II) used for the Gerber test, or formed during the test, causes too high vals. for the % of fat to be obtained. The acid, milk, and

(II) must be added in that order. The "oily impurities" test is valueless for detecting (I) in (II). A modified procedure is suggested for the selection of suitable (II).

E. C. S.

Ghee and vegetable ghee. F. WITTKA (Allgem. Oel- u. Fett-Ztg., 1935, 32, 196—199).—The economic situation arising from the extensive adulteration of Indian ghee with "vegetable ghee" and hardened fish oils is discussed.

E. L.

Red fungus [on preserved fish]. K. STRUVE (Deuts. Fischerei-Runds., 1934, 418—419; Chem. Zentr., 1934, ii, 3561).—Exclusion of air by an oil layer hinders, but does not prevent, growth of the fungus. The use of various preservatives is discussed.

H. J. E.

Bacteriological and thermal basis for preparation of preserved meat at various temperatures. H. GUTSCHMIDT (Arb. Reichsgesundh.-Amt., 1934, 213—232; Chem. Zentr., 1934, ii, 4033).—A review of optimum conditions.

H. J. E.

Material for coating shredded suet. J. T. DUNN and H. C. L. BLOXAM (Analyst, 1935, 60, 320—321).—The coating consisted of soya-bean meal.

E. C. S.

Frozen vegetables. R. P. STRAKA and L. H. JAMES (J. Bact., 1935, 29, 313—322).—No evidence was obtained of the formation of toxin from *Cl. botulinum* in peas stored under ice-box conditions. The effects of storage conditions after thawing are examined.

A. G. P.

Artificial ripening of subtropical fruit by alcohol and ethylene. S. SOLDATENKOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 571—576).—Japanese persimmons (*Diospyros kaki*, L.) can be ripened in 3—4 days by enclosure in a sealed compartment with a saturated EtOH solution of C_2H_4 , whereas only a portion of the controls ripen 25—30 days later. Airing and recharging 4—6 times every 48 hr. is necessary with lemons; oranges can be similarly ripened in 6—10 days.

P. G. M.

Heat and dryness as sources of danger with tinned conserves. W. FRIEDRICH (Obst- u. Gemüse Verwertg.-Ind., 1934, 21, 393—395; Chem. Zentr., 1934, ii, 4033).—Weather conditions (temp. > 27°) may increase the resistance of bacterial spores in fruit and vegetables, necessitating longer or higher-temp. sterilisation than normally. Evacuation exercises a preservative effect.

J. S. A.

Failures in fruit preserving. W. FRIEDRICH (Obst- u. Gemüse-Verwertg.-Ind., 1934, 21, 525—526; Chem. Zentr., 1934, ii, 4033).—A discussion of the causes of corrosion, discoloration, etc. in canning pears.

J. S. A.

Bacteriology of canning. VIII. Food-poisoning bacteria. S. LANCEFIELD (Food, 1935, 4, 372—374; cf. B., 1935, 572).—A list of the organisms belonging to the *Salmonella* group which cause food-poisoning is given, and the general morphological characteristics and cultural reactions are briefly described. Some elementary details concerning the methods of sampling and determining the bacterial count of H_2O supplies to canning factories are given.

E. B. H.

Vitamin-A content of five varieties of sweet-potato. F. L. MACLEOD, M. R. ARMSTRONG, M. E. HEAP,

and L. A. TOLBERT (J. Agric. Res., 1935, 50, 181—187).—The vitamin-A contents increased considerably during storage. A. G. P.

Effect of grinding in a power mill on albuminoid [protein] content of feeding-stuffs. F. R. DODD and C. R. LOUDEN (Analyst, 1935, 60, 299—300).—Elliott's results (cf. B., 1934, 1035) with regard to the selective loss of protein during grinding are not confirmed. E. C. S.

Effect of temperature of artificial drying on digestibility and availability of nutrients in pasture herbage. R. E. HODGSON, J. C. KNOTT, R. R. GRAVES, and H. K. MURER (J. Agric. Res., 1935, 50, 149—164).—Grass dried with exhaust temp. of 250°, 300°, and 350° had substantially the same digestibility (I) as the fresh material. Drying at 400° lowered the apparent (I) of the crude protein, dry matter, and N-free extract. In comparative trials of fresh, sun-cured, and artificially dried herbage, positive balances for N, Ca, and P were maintained in all cases. The Ca balance for grass dried at 400° was very low. A. G. P.

Effect of full *versus* limited feeding on the protein level required in the hog ration. E. W. CRAMPTON (Sci. Agric., 1935, 15, 463—475).—Observations are recorded of the live-wt. increases and market quality of pigs receiving various levels of feeding. The influence of different levels of protein was not affected by the total amount of food given. A. G. P.

Diastasis of wheat starch. Fodder yeast from wood sugar.—See XVII. Diastatic strength. See XVIII.

See also A., June, 701, **Hydrolysis of gluten.** 779, **Report [on conversion of fresh sorghum into hay].** 792—4, **Vitamins.** 795, **Odorous substances of green tea.**

PATENTS.

Preparation of spice or other vegetable flavouring products. H. E. POTTS. From CONTINENTAL CAN Co., Inc. (B.P. 427,677, 4.4.34).—See U.S.P. 1,956,426; B., 1935, 173.

Aërating liquids. Treating liquids [milk]. Separating suspended materials from gases.—See I. Transparent wrappers.—See V. Gelatinous product.—See XV. Vitamin concentrates.—See XVIII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

The hand homogeniser and its use for extemporaneous preparation of pharmaceutical emulsions. L. F. TICE (Amer. J. Pharm., 1935, 107, 158—161).—The application of the laboratory homogeniser in which the mixture is forced through a fine orifice against a high back-pressure is described. E. H. S.

Stabilisation of injectable sodium thiosulphate solution. O. A. ROSSI (An. Farm. Bioquim., 1934, 5, 1—2; Chem. Zentr., 1934, ii, 3527).—A neutral, non-toxic solution is obtained by dissolving in distilled H₂O and adding a trace of NaOH. R. N. C.

Some salts of camphorsulphonic acid used in hypodermic therapy. L. NOBILI (G. Farm. Chim. Sci. aff., 1934, 83, 218—224; Chem. Zentr., 1934, ii, 3407).—

The solubilities and therapeutic val. of Na, Ca, Li, and neutral sparteine camphorsulphonates are described in detail. H. N. R.

Stability of diothane solutions. II. E. S. COOK, K. BAMBACH, and T. H. RIDER (J. Amer. Pharm. Assoc., 1935, 24, 269—271; cf. A., 1933, 420).—0.1 p.p.m. of NH₂Ph (I) is detected by diazotisation and coupling with H-acid; the reaction is used as a basis for a colorimetric determination of (I). Ageing or prolonged heating of diothane solutions produces (I); the reaction is inhibited by acid. H. D.

Preservation of a solution of belladonna extract and determination of its alkaloid content. G. JUNGHANS (Apoth.-Ztg., 1934, 49, 325—327; Chem. Zentr., 1934, ii, 3526—3527).—Addition of 5% of EtOH to the extract (E) (D.A.B. V) does not sterilise it; a sterile and stable solution is prepared by shaking E with H₂O and 90% EtOH in the proportion 1:1:1, decanting after 24 hr., and dissolving the residue in a 1:1 mixture of H₂O and 90% EtOH. The standard (D.A.B. VI) method of determining the alkaloid content is improved by substituting MgO for NH₃, and reducing the quantity of tragacanth. The method gives an alkaloid content of 1.25% as compared with 1.5% by the D.A.B. VI method; a correction is therefore applied to the val. found, or the amount of dextrin to be added is altered correspondingly. R. N. C.

Rapid identification of cinchona preparations by the erythroquinine and thalleioquinine reactions. R. MONNET (J. Pharm. Chim., 1935, [viii], 21, 450—456).—Small amounts of cinchona alkaloids (I) in medicinal preps. are detected by shaking an aq. NH₃ or NaOH solution with CHCl₃ (5 c.c.), shaking the CHCl₃ layer with 1% AcOH (3 c.c.), and applying (a) the erythroquinine or (b) the thalleioquinine test to the mixture. The colour in (a) always, and in (b) often (particularly if the solution is diluted), passes into the CHCl₃, thus enhancing the delicacy and specificity of the test. Of common additions to (I) only aloin interferes, and even then the colour imparted to the CHCl₃ is characteristic if NaOH is used instead of the usual NH₃ in (a). R. S. C.

Evaluation of Jalap resin. A. J. BANDONI (An. Farm. Bioquim., 1934, 5, 8—17; Chem. Zentr., 1934, ii, 3656).—COMe₂ extracts only the resin from the drug. It is therefore preferable to EtOH, recommended in the Argentine Pharmacopœia. H. J. E.

Action of cellulose filter-pads in cigarettes on the nicotine content of the smoke. W. PREISS (Pharm. Zentr., 1935, 76, 313—316).—The filter-pad (1.1 cm. long) removes about 20% of the nicotine (I) from the smoke, but compared with the total (I) and the (I) removed from the smoke by a stump of the same length as the pad the advantage is only slight and can be equalled by smoking to a slightly longer stump (cf. B., 1933, 1083). E. H. S.

Air-lift extractor applied to analysis of alkaloidal drug extracts. L. D. SEIF and T. H. RIDER (J. Amer. Pharm. Assoc., 1935, 24, 267—268).—Aq. NH₃ is used in the apparatus instead of NaOH (cf. A., 1933, 1135). Alkaloids are extracted from a no. of products

and the results agree with those obtained using the hand-shake-out method. H. D.

Determination of alkaloids with bromine. R. A. HATCHER and R. L. HATCHER (J. Amer. Pharm. Assoc., 1935, 24, 262—267).—The vol. of solution of alkaloid required almost to decolorise 0.1N-Br solution in dil. HCl is determined. Greater accuracy is obtained by placing a layer of CHCl_3 above the solution, or by adding apomorphine (which gives a pink colour with free Br). H. D.

Determination of silver in organic medicinals. Colloidal silver ointment. G. ANTOINE (J. Pharm. Chim., 1935, [viii], 21, 457—466).—The material (0.1—0.3 g.) is heated with H_2SO_4 (3 c.c.; d 1.84) and HNO_3 (5 c.c.; d 1.38) until evolution of fumes ceases. HClO_4 - HNO_3 (1:2) is added drop by drop. The solution is boiled for 4—5 min., cooled, treated with H_2O (20 c.c.) and saturated Fe^{+++} alum solution (2 c.c.), and titrated with 0.1N-KCNS. Commercial colloidal Ag ointment is often heterogeneous. Homogeneity is ensured only by smearing the sides of the mortar with lanoline before mixing. R. S. C.

Essential oils of gum elemi. M. MLADENOVIC (Bull. Soc. Chim. Yougoslav., 1934, 5, 143—149).—A substance, $\text{C}_{10}\text{H}_{18}\text{O}_2$ (probably dihydroxyphellandrene), m.p. 168° , $[\alpha]_D^{25} + 10.39^\circ$ in EtOH, has been isolated from the essential oils of Manila gum elemi. R. T.

Oils of *Artemisia rigida* (Nutt.), Gray. G. NORIN and R. L. McMURRAY (Amer. J. Pharm., 1935, 107, 177—178).—Steam-distillation of the air-dried, blooming tops of *A. rigida* gave 0.56% of essential oil which, after separation of the steareptene (27.92% at 15°), had: d_{25}^{25} 0.9367, $[\alpha]_D^{25} - 16.75^\circ$, n_D^{25} 1.4674, acid val. 3.63, ester val. 19.46, and sap. val. 23.09. Extraction of the residue gave 1.88% of fatty oil having d_{40}^{40} 0.9945, n_D^{40} 1.4968, acid val. 36.68, ester val. 91.64, I val. 58.71, and sap. val. 128.32. E. H. S.

Physiological forms of the Eucalypts. A. R. PENFOLD (Perf. Ess. Oil Rec., 1935, 26, 178—179).—*E. dives* exists in several varieties distinguishable only by the character of their essential oils, i.e., oils from Type, varieties "A," "B," and "C," are obtained, respectively, in yields of 2.5—4.0, 1.5—4.0, 3—4, and 2—3% and have: d 0.892—0.907, 0.863—0.877, 0.906—0.915, 0.916—0.924; α -58° to -80° , -44° to -70° , -13° to -28° , $+1^\circ$ to $+8^\circ$, piperitone 46—53, 5, 10—20, $< 5\%$; cineole —, —, 25—45, 60—75%; phellandrene about 40%, 75—80%, present in quantity, nil. Similar variations exist in other species of Eucalypts and a revision of the botanical nomenclature is urged. E. H. S.

Patchouli oil of the Seychelles. W. HOLDSWORTH-HAINES (Perf. Ess. Oil Rec., 1935, 26, 171—174).—The commercial oil (d 0.9672, sol. in 10 vols. of 90% EtOH) is obtained in a yield of 3.5—5.0% from dried, partly fermented leaves distilled mainly in under-fired stills. Unfermented leaves give a larger yield and a less sol. oil, and direct steam-distillation gives the same yield but a more sol. oil (d 0.9661, sol. in 5 vols. of 90% EtOH). Solubility increases with dryness of the

steam. The cultivation and prep. of the leaves and the ordinances controlling the export of the oil are described. E. H. S.

Stability of H_2O_2 solution.—See VII. Cod-liver oil. —See XII. Agar gel. —See XV. Tobacco. —See XVI.

See also A., June, 719, Determining traces of Ag in H_2O . 720, Determining reduced Fe. 723, Alloy for Ra beam therapy. 744, Prep. of phenacetin. 750, Prep. of vanillin from sawdust and sulphite liquor. 754, Chinese drug, tan-shin. 755, α - and β -Santalols. 759, Condensation of aromatic aldehydes with barbituric acid. 760, Quinazoline derivatives. Synthesis of lactoflavin and other flavins. 764—7, Alkaloids and derivatives. 767—8, As and Hg organo-compounds. 769, Morphine reaction. Titration of alkaloid salts. 789, Prep. of adrenal cortical hormone. 792—4, Vitamins. 795, Odorous substance of green tea. 796, Indian medical plants. Alkaloids in ipecacuanha root. 797, Volatile oil of *Hyptis mutabilis*. Oil of rose mallow. Nucleic acid of ergot. 798, Yellow tobacco mosaic.

PATENTS.

Preparation of a stable hydro-alcoholic extract of ergot. F. W. NITARDY, Assr. to E. R. SQUIBB & SONS (U.S.P. 1,969,382, 7.8.34. Appl., 21.5.32).—Ergot is extracted with a mixture of aq. EtOH and acid, e.g., HCl, to give an extract having pH 2.5—3. E. H. S.

Therapeutic products containing *Lactobacillus acidophilus*. W. L. OWEN (B.P. 427,488, 25.10.33).—Suppression of *L. acidophilus* (I) by lactic bacteria is avoided, yielding stable cultures, by seeding a culture medium, e.g., a malt wort of approx. 4° Brix acidified with lactic acid \equiv 7 c.c. of 0.1N-NaOH per 10 c.c., with (I), allowing it to develop, seeding this with ordinary yeast (II), e.g., *Sacc. cerevisiae* or *ellipsoideus* and not "wild yeasts," allowing (I) and (II) to develop symbiotically, with vigorous aeration, and then separating them from the medium; the product may be compressed into cakes, wrapped in Sn foil, and stored. A. W. B.

Preparation of hormones. SCHERING-KAHLBAUM A.-G. (B.P. 428,419, 21.6.34. Ger., 22.6.33. Addn. to B.P. 396,581; B., 1933, 845).—Pptg. agents having $pH > 3$ are employed and the ppt. is dissolved in aq. alkali and repptd. by addition of either COMe_2 or EtOH and a solvent for fat. E. H. S.

Production of (A) follicle hormone hydrate, (B) acyl derivatives of dihydrofollicle hormone, (C, D) hydrogenation products of follicle hormones. SCHERING-KAHLBAUM A.-G. (B.P. 427,428, 427,436, 427,561, and 427,588, [A, c] 26.10.33, [B] 22.12.33, [D] 12.4.34. Ger., [A, c] 27.10.32, [B] 23.12.32, [D] 13.4.33).—(A) Dihydrofollicle hormone (I) is dehydrated, e.g., by heating with KHSO_4 at 120° , and the unsaturated phenol, $\text{C}_{18}\text{H}_{22}\text{O}$, produced is dihydroxylated, e.g., by action of H_2O_2 in AcOH in presence of Ag_2SO_4 and NaHSO_4 as catalysts. (B) (I) is acylated by known methods, follicle hormones (II) are simultaneously acylated and reduced, or the acyl derivatives of (II) are reduced. E.g., (I) with BzCl (2 equivs.) and aq. NaOH gives the Bz (III), m.p. 187.5 — 190° , and with BzCl

in C_5H_5N the Bz_2 derivative, m.p. 169—170°; the Ac and $Ac Bz$ derivatives are also described. (III) is also prepared by reducing the Bz derivative of (II) with H_2 and Ni-Cr in EtOH at 120°, and a Ac_2 derivative of (I) is obtained by reduction of (II) in Ac_2O (+ NaOAc) with Zn dust. (c) The C_6H_6 ring of (I) (mixed isomerides) is hydrogenated, e.g., with H_2 and Ni-Cu in EtOH at 160—170°. (d) Products, apparently of the same type as in (c), are prepared by hydrogenation of (II) under such conditions that the CO is reduced to CH_2OH and the C_6H_6 nucleus is saturated, e.g., with H_2 and Ni-Cu in 10% aq. KOH at 160°/100 atm., or with H_2 -Ni in cyclohexanol at 170°/60—70 atm. The products are amorphous. H. A. P.

Manufacture of (A, B) hydrogenation products of follicle hormones, (c) mono- and di-acetates of the dihydrofollicle hormone. SCHERING-KAHLBAUM A.-G. (B.P. 428,132—3 and 428,215, 26.10.33. Ger., [A] 27.10. and 23.12.32, [B] 23.12.32, [c] 1.9.33).—The CO group of the hormone is reduced to CH_2OH without hydrogenation of the C_6H_6 ring, (A) by activated or nascent H , or (B) by reduction of the oxime to the amine followed by treatment with HNO_2 . (c) The dihydrofollicle hormone is acetylated by action of $AcOH$ in presence of HBr , HI , or $C_6H_4Me.SO_3H$. The mono-, m.p. 210—213°, and di-acetate, m.p. 120—121.5°, are separated by recrystallisation. E. H. S.

Manufacture of organo-mercury compounds. I. G. FARBERIND. A.-G. (B.P. 427,974, 3.11.33. Ger., 5.11.32).—Alkoxyalkyl-Hg salts or hydroxides are treated in an org. solvent with acids giving salts less sol. in the solvent than the original. E.g., H_2SO_4 (49 pts.) in $COMe_2$ (1000 pts.) is added to $OMe.C_2H_4.Hg.OH$ (276 pts.) in $COMe_2$ (600 pts.); the sulphate, m.p. > 280°, is pptd. The phosphate, m.p. 112—113° (decomp.), oxalate, m.p. 164—165° (decomp.), succinate, m.p. 93°, orthoarsenate, m.p. 106°, and tartrate, m.p. 153°, and o-methoxycyclohexyl mercury phosphate, m.p. > 250°, are similarly prepared. H. A. P.

Manufacture of organo-mercury compounds. H. E. PARKER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 427,979, 3.11.33).— C_2HCl_3 is shaken (9 hr.) with a freshly prepared solution made by mixing aq. $Hg(CN)_2$ with excess of NaOH; the C_2HCl_3 layer is separated and distilled in steam, leaving a residue of Hg trichloroethylene. H. A. P.

Halide-mercuri-nitrocresols. [Pharmaceuticals.] G. W. RAIZISS, Assr. to ABBOTT LABS. (U.S.P. 1,967,686, 24.7.34. Appl., 26.1.33).—The following are prepared by adding HCl to a dil. NaOH solution of the appropriate anhydronitrohydroxytolylmercuri-hydroxide: 4-nitro-2-hydroxy-m-, 5-nitro-6-hydroxy-m-, 5-nitro-4-hydroxy-m-, 2-nitro-5-hydroxy-p-, and 6-nitro-5-hydroxy-o-tolylmercurichloride. A. W. B.

Thymol. Colloidal solutions of inorg. substances.—See III. **Cosmetics.**—See XII. **Vitamin concentrates.**—See XVIII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Fixing and stop-baths for [photographic] papers. E. WEYDE (Brit. J. Phot., 1935, 82, 326—327).—The

capacity of a fixing bath (F) is discussed; an intermediate acid stop-bath (S) after development is recommended, preferably $AcOH$ (concn. $\geq 2\%$) or $K_2S_2O_5$ (5%). For large batches of prints, rinsing between S and F is preferable. J. L.

Acceleration of development by thiocarbamide. LÜPPO-CRAMER (Phot. Korr., 1934, 70, 145—148; Chem. Zentr., 1934, ii, 3892).—The early stages of development with a slow developer are greatly accelerated (without fogging) by washing plates after exposure in 1:10⁵ thiosinamine or $CS(NH_2)_2$ (I) solution. Highly sensitive plates show fogging. Larger amounts of (I) produce pseudo-solarisation. H. J. E.

Chemistry and practice of the [photographic] fixing process. W. SCHRAMM (Brit. J. Phot., 1935, 82, 360—362).—The importance of complete fixing and washing is stressed, and the $Ag-Na_2S_2O_4$ complexes formed are discussed. Bisulphite stop-baths and double fixing are recommended. J. L.

See also A., June, 697, Adsorption of optical sensitisers for Ag salts. 702, Reaction of Ag ions with gelatin. 712, Relation between p_H and sensitivity. Density surfaces by physical development. Development. Sensitivity of emulsions. Pressure effect on sensitivity. Ascorbic acid and developing action. Influence of alkali iodides on emulsions. Light-sensitivity of emulsions. 713, Artificial light sources. Photolysis of diazo compounds. 722, Infra-red photography of coal. 744, p-Methylaminophenol.

PATENTS.

Production of coloured photographic materials. B. GASPAR (B.P. 428,158, 17.4.34. Ger., 19.4.33. Addn. to B.P. 415,756; B., 1934, 1037).—The use of quaternary salts (e.g., alkylsulphates) of heterocyclic org. bases (e.g., alkyl-naphtho- or anthra-quinolines, benz- or naphtho-thiazoles; selenazolium or oxazolium salts, wherein the atoms C3—C4 of the pyrrole ring are substituted by S, Se, or O) is claimed. J. L.

Photographic developer and development. H. L. TRUMBULL, Assr. to B. F. GOODRICH CO. (U.S.P. 1,969,243, 7.8.34. Appl., 23.1.32).—New developers claimed are of the class of (OH)-substituted diarylamines, especially N-aryl-substituted aminophenols, and mono-substituted diphenylamines, e.g., the p-OH-derivative. The free base or salts (e.g., hydrochloride) may be used. The developers are preferably used in the ordinary weak alkaline solutions. These substances are very stable, dry or in solution, and allow an unusual latitude for under- or over-exposure. J. L.

Density determination by X-rays [photography]. G. LEVENE and W. KONIKOV, Assrs. to MASSACHUSETTS MEMORIAL HOSPITALS (U.S.P. 1,973,906, 18.9.34. Appl., 18.11.30).—The material, preferably a liquid, and a wedge-shaped standard of known absorptive capacity at its various thicknesses are photographed by X-rays simultaneously on the same film. B. M. V.

XXII.—EXPLOSIVES; MATCHES.

Density and stability of cellulose nitrate explosives. O. DRUETZKA (Bull. Soc. Chim. Yougoslav.,

1934, 5, 189—195).—The d and stability fall on storing. R. T.

Velocity of the shock-wave not affected by rate of detonation of an explosive. D. B. GAWTHROP (J. Franklin Inst., 1935, 219, 471—476).—The rate of detonation of an explosive has no effect on the velocity of the shock-wave (I) sent out from a blown-out shot. (I) increases with the wt. of explosive fired, the increase being greatest near the mouth of the bore-hole. The effect of this on the ignition of CH_4 in a mine, when an explosive is fired in it, is discussed. A. J. M.

Nitrocellulose.—See V.

PATENTS.

Explosive coating material. N. G. JOHNSON and H. A. LEWIS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,972,938, 11.9.34. Appl., 21.4.33).— NH_4ClO_4 , NH_4NO_3 , or other inorg. explosive is coated with pentaerythritol tetranitrate, and, if desired, with nitro-starch as additional sensitiser. B. M. V.

Halogenovinylacetylenes.—See III.

XXIII.—SANITATION; WATER PURIFICATION.

Drying sewage sludge on vacuum filters. F. W. JONES (Amer. City, 1935, 50, No. 1, 43—45).—The % of volatile matter in digested sludge is unrelated to the filter-cake yield (Y) or to the amount of FeCl_3 (I) necessary for reconditioning. Y is \propto (I) only within certain limits, beyond which Y falls with increasing (I). Dense sludge (88—90% of H_2O) can be filtered without dilution. Best results are obtained at p_H 6.3—6.5.

CH. ABS. (p)

Determination of traces of hydrogen sulphide in sewer gases. Convenient field method. W. J. WILEY (Ind. Eng. Chem. [Anal.], 1935, 7, 202—203).—1 litre of sewage gas is aspirated by means of a portable apparatus through 10 c.c. of 5% aq. KOH. 5 drops of K plumbate are added, and the colour is compared with that of a permanent mixed-dye standard. J. S. A.

Bacteriological evaluation of disinfectants. H. SCHMIDT-HEBBEL (Pharm. Zentr., 1935, 76, 317).—The suspension and carrier ("Keimtrager") methods are discussed. E. H. S.

Brewing-water problems. H. FINK (Woch. Brau., 1935, 52, 169—172).—Methods are described and discussed for removing carbonates from brewing liquor (I), including simple $\text{Ca}(\text{OH})_2$ treatment in the cold, intimate mixing processes, and the use of contact catalysts. Disadvantages of the presence of Mg^{++} in (I) are indicated, and its removal or diminution by over-softening and subsequent CO_2 treatment and by "split-treatment" is discussed. I. A. P.

Chlorine treatment of brewery water. G. ORNSTEIN (Tages-Ztg. Brauerei, 1934, 32, 669—673; Chem. Zentr., 1934, ii, 3659).— Cl_2 treatment (0.3—0.7 mg. per litre) sterilised the H_2O , and did not interfere with yeast growth. H. J. E.

Determination of traces of cyanides in water. A. E. CHILDS and W. C. BALL (Analyst, 1935, 60, 294—299).—The filtered sample (500 ml.) is acidified with

tartaric acid and distilled. The first 50 ml. of distillate contain all the HCN, which is determined colorimetrically in aliquot samples by means of the Prussian-blue, CNS', AgCN , and phenolphthalein tests. The sensitivity and specificity of the tests are discussed. E. C. S.

Oligodynamic action of metals and the "kataklysm" process. H. BEGER (Kl. Mitt. Ver. Wasser-, Boden-, Lufthyg., 1934, 10, 182—206, 339—349; Chem. Zentr., 1934, ii, 3808).—A review and discussion. H. J. E.

Chlorination of CH_4 .—See III.

See also A., June, 717, **Determining O_2 in H_2O .** 719, **Quant. spetro-analysis of Cs in mineral waters.** **Determining Ag in H_2O .**

PATENTS.

Mucin solvent agent. C. C. VOGT (U.S.P. 1,969,340, 7.8.34. Appl., 27.1.31).—A compound, e.g., a dentrifrice, for dissolving mucin contains $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$ or a similar type of substituted NH_4OH and forms an aq. solution having $p_H < 9$. E. H. S.

High-temperature incinerator furnace. E. G. BAILEY, Assr. to BABCOCK & WILCOX Co. (U.S.P. 1,973,697, 18.9.34. Appl., 15.10.32).—Refuse or the like is dried by radiant heat on a sloping surface which is H_2O -cooled to prevent sticking of the drying garbage; the latter is then burned at high temp. on a refractory bottom with formation of slag which is tapped off. The first row of boiler tubes above is covered with refractory material to act as a sticky screen for fly ash. The high temp. is attained by a pulverised fuel flame taking a U-shaped path which is partly or completely shut off in full operation. B. M. V.

(A) **Incineration of garbage.** (B) **Incinerating plant.** (A) H. H. BIGHOUSE, (B) I. S. OSBORN, Assrs. to C. O. BARTLETT & SNOW Co. (U.S.P. 1,974,231 and 1,974,250, 18.9.34. Appl., [A] 24.6.32, [B] 21.12.32).—(A) From a combustion chamber (C) for dried refuse (R) the gases are partly (G_1) passed direct to the stack and partly (G_2) through a rotary cylindrical or other dryer concurrent with the raw refuse. G_2 having become very moist are mixed with G_1 before discharge to atm. and R is conveyed back to C. (B) A no. of units comprising dryer and combustion chamber are connected to 2 main flues, a single stack, and a single conveyor. B. M. V.

Apparatus for recovering commercially valuable constituents from industrial waste products by distillation processes. G. ANDREWS (B.P. 427,982, 8.11.33).—A jacketed vessel having the inlet, vapour outlet, and connexion to a vac. pump through the lid and a drain through the bottom is described. The vapour departs to a condensing and storage tank which is cooled by a coil. B. M. V.

Preparing and putting up oleaginous disinfectants. PEASE & PARTNERS, LTD., W. T. K. BRAUNHOLTZ, and R. L. ROBINSON (B.P. 428,317, 6.2.34).—Disinfectants and insecticides are prepared from oils derived from coal, including cresols, by emulsifying with gelatin or glue, with or without the addition of soap, to give stable jellies unpourable at room temp., but sol. in H_2O . Finely-divided, solid, active ingredients may also be added. C. C.